Chapter 22
Expert Judgement in Terrorism Risk Assessment

Gordon Woo

Abstract Since 9/11, the probabilistic risk assessment of losses from terrorism has formed a quantitative basis for informed terrorism risk management. An irreducible element is the elicitation of expert judgement. In any application domain, the reliance on expert judgement can be minimized through the establishment of core conceptual principles, such as economic game theory and adversarial risk analysis, which govern the risk phenomena under consideration. For non-state threat actors, such as the Jihadi groups, Al Qaeda and ISIS, their limited logistical resources compared with western counter-terrorism intelligence and law enforcement capacity, greatly constrain the spectrum of their operations, which can be modelled quite reliably in a probabilistic manner. However, state-sponsored terrorism poses a much more severe challenge, especially in connection with the use of weapons of mass destruction, such as nuclear and chemical weapons. In this paper, the fundamental principles of terrorism risk assessment are reviewed, and the use of expert judgement is illustrated in relation to state-sponsored nuclear and chemical weapon deployment.

22.1 Introduction

Terrorism is asymmetric warfare between opponents of contrasting military capability. The German general, Helmuth von Moltke, openly declared that 'in war, everything is uncertain'. Famously, he wrote that no plan of operation extends with certainty beyond the first encounter with the enemy's main strength. This has become a universally accepted tenet of warfare. In contrast with the deterministic game of chess, the Prussian military invented board games with dice to introduce an aleatory element.

The outcome of chess tournaments is open to speculation and wagering. But imagine the challenge of trying to forecast the outcome of a chess match between two grandmasters, where some moves were decided by the throw of dice. Knowledge

G. Woo (✉)
RMS, 30 Monument Street, London EC3R 8NB, UK
e-mail: Gordon.Woo@rms.com

A. M. Hanea et al. (eds.), *Expert Judgement in Risk and Decision Analysis*,
International Series in Operations Research & Management Science 293,
https://doi.org/10.1007/978-3-030-46474-5_22

of the chess playing styles, strengths and tournament records of the adversaries would inform the expert judgement of the forecasters, but this would be tempered by the added aleatory component.

The Roman general and historian, Julius Caesar, noted that in war, events of importance are the result of trivial causes. Sometimes, the outcome of a terrorist attack is as unlikely as throwing a series of sixes. On 16 January 2013, Jihadis armed with light weapons attacked the InAmenas gas plant in Algeria, operated by Statoil. The plant should have been blown up, but for a stray celebratory terrorist bullet from an AK-47 that accidentally cut the plant power supply and shut down operations. Counterfactually, without this remarkable fortune, the gas plant could have been destroyed. Contingencies such as at InAmenas cannot be forecasted, but the likelihood of operational success and failure can be estimated, based on the technical capability of a terrorist organization, and most importantly its modus operandi. Understanding terrorist modus operandi is like knowing the rules of chess.

22.1.1 Dependence on Human Behaviour

Like all human activities, individual idiosyncrasies of human behaviour, (such as firing an AK-47 in the air), will manifest themselves in the actions of terrorists, but there are some important over-riding factors that govern terrorist behaviour to a considerable extent. In the case of Jihadis, Islamic law is a powerful controlling influence on their terrorist actions. In Arabic, the word for rationality is *aqlaniyyah*, which is an expression of the total basis upon which a person acts (Rauf 2015). For Muslims, this basis must be derived from the ethics, philosophy and traditions of the Islamic religion.

It is often noted that, prior to launching a terrorist attack, Jihadis will immerse themselves in readings from the Qur'an, with the firm assurance of paradise for those who are martyred. In the Qur'an (9:111), it states: '*Allah hath purchased of the believers their persons and their goods; for theirs in return is the garden of Paradise. They fight in His cause, and slay and are slain*'.

One of the resolute long-term ambitions of Jihadis is to bring about an Islamic state. Because such a state would not espouse the same values as a liberal democracy, attempts to coerce western nations through violence lead to acts of terrorism. The characteristics of such terrorism depend much less on individual human behaviour than on a common general religious belief system, and so are far more predictable.

Furthermore, just as the threat of legal sanction constrains the behaviour of criminals, so law enforcement services and security forces constrain the behaviour of terrorists. These are especially tough constraints within the well-funded English-speaking Five Eyes security alliance of USA, UK, Canada, Australia and New Zealand. In these countries, there are tight restrictions on access to bomb-making material, and elaborate plots are very likely to be disrupted.

Besides classified information on the terrorist threat, there is also classified information on counter-terrorism activities. Some information of this kind can be privately

accessed through attending annual closed intelligence and terrorism meetings, or discussions under the Chatham House Rule. Other important sensitive information has been publicly disclosed in large volumes by the NSA whistleblower Edward Snowden in June 2013 (Harding 2014). This unauthorized disclosure confirms that the principal agent for counter-terrorism control is massive electronic surveillance and acquisition of communications meta-data, involving multiple contact chaining of terrorist suspects. The details of this surveillance were hitherto classified, but nonetheless have been deliberately leaked into the public domain and so can inform terrorism risk assessment.

We shall argue for and illustrate the potential of structured expert judgement procedures in the development of terrorism risk assessment, noting several areas in which it can be usefully applied. The confidential nature of the context means that our discussion will be general without detailed SEJ case studies.

22.2 Principles of Terrorism Risk Modelling

Terrorist resources of finance, manpower and weaponry are much less than that are available to nation states, so they have to be deployed in an optimally effective and efficient manner. Essentially, excessive effort should not be expended in the short term to achieve their long-term objectives. Extravagant use of resources can doom a terrorist organization to oblivion. The general principle of least action is a guiding principle of the fundamental way that the universe works. This has been expressed in a contemporary fashion by Coopersmith (2017) in the title of her book: 'the lazy universe'. Terrorists are lazy in the sense that they are work-averse; there is no point in doing more work than is necessary to advance their goals. Attack strategies of nation states may involve wanton expenditure of multi-billion dollar armament budgets, but terrorists cannot afford profligacy. Terrorists need to be frugal with their resources; achieving high leverage, which is the ratio of attack impact to cost. This is exemplified by 9/11: the leverage for this Al Qaeda attack was approximately 100,000, which is the ratio of the economic loss impact of $50 billion to the comparatively modest operational cost of $500,000. The requirement of high leverage is a major input factor in terrorist attack modelling.

Terrorism is the language of being noticed. This can be achieved in the simplest way through a knife attack in a location with high name recognition. In U.K., where access to firearms and bomb-making ingredients is restricted, knife attacks have higher leverage. London Bridge, a popular landmark with high name recognition, was the location of terrorist knife attacks on 3 June 2017 and 29 November 2019. In both cases, fake suicide bomb belts were worn by the Jihadis. Their terrorist goals were well met without the actual need to make real suicide bomb belts, which might have been well beyond their resources and capabilities, and even patience.

In the case of the London Bridge attacks, the targets were defenceless civilians. These were the softest of targets. More generally, terrorists may decide to attack harder targets which have security weaknesses. There is little to be gained by attacking

well-defended targets, when there are vulnerable targets available. Defenders will seek to reduce their vulnerability by improving security in various affordable and practical ways.

The adversarial nature of terrorism and political violence is captured within the methodology of game theory, which addresses the strategic interactions between opposing groups. The behavioural aspects of these interactions are accounted for in behavioural game theory (Camerer 2003), and also adversarial game theory (e.g. Rios et al. 2012; Rios Insua et al. 2009; Banks et al. 2015).

22.2.1 Target Substitution

A direct application of game theoretic principles is in the terrorist substitution of targets according to security levels. A common misjudgement about terrorist targeting is that everything is a potential target. This misjudgement arises from the impression that the mind of a suicide terrorist is irrational and that a Jihadi martyr is deranged. However, a decision by a Jihadi to kill himself in the course of a terrorist attack is not irrational within the religious system of belief that paradise awaits a martyr. This is a modern twenty-first century version of Pascal's wager, which is a probabilistic cost-benefit argument for believing in God, despite doubt and scepticism over the existence of God.

The concept of terrorist target substitution applies at all spatial geographical scales: national, city, and building level. At a national level, British Jihadis angered at U.S. foreign policy, may be deterred by U.S. border security from attacking the U.S. homeland, and choose to attack U.K. instead. This is what happened in the London transport bombings of 7 July 2005. At a city level, when there was a police cordon around London, IRA bombers turned around and drove north to bomb England's second city, Manchester, instead. At a building level, Chechen black widows have switched building targets in central Moscow at the last moment if extra security was observed at the original target.

The principle of terrorist target substation underlies the widespread concern over the multiplicity of soft targets in western countries. The more obviously attractive targets are hardened commensurately with their perceived value to a terrorist organization. It is no longer possible to drive vehicles within close bombing distance of the most attractive urban bombing targets, such as principal government buildings. Accordingly, instead of bombing the U.K. parliament, which has long been a Jihadi aspiration, the soft London underground was targeted in 2005. Progressively, since 9/11, the security community has diminished the range of vulnerable targets that might be of interest to terrorists in their attack planning. As a consequence, there has been a progressive reduction in the range of targets against which plots have been organized. As vulnerable targets have been hardened, they have been substituted by softer targets.

22.2.2 Terrorist Weaponry

Terrorists tend to be work-averse and follow the path of least resistance in their choice of weaponry. Off-the-shelf light military weapons, such as guns, are a common choice for terrorists in countries with ready firearm access. In June 2019, Ashiqul Alam, a young Jihadi from Queens, was arrested for plotting to attack Times Square in New York City, using guns and hand grenades to kill police officers and civilians. Individual lone actors like him would be capable of making a significant impact just using conventional weapons. This would not be the case if more ambitious weaponry were considered, or if there were experimentation with advanced weapons of mass destruction. Indeed, even if Ahiqul Alam had been a member of a large terrorist cell, the possibility of deploying a sophisticated, innovative and dangerous weapon would have been extremely remote.

One class of weapons which is coming within reach of work-averse terrorists are Unmanned Aircraft Systems, commonly known as drones. The technology of drones is advancing rapidly. Terrorists need not have the technical capability to construct drones; they have become relatively easy to acquire and operate. On 4 August 2018, two drones equipped with a kilogram of plastic explosives were used in an assassination attempt on President Nicolas Maduro of Venezuela. Powerful smart drones are now a viable attractive option for transporting and delivering payloads ranging from small packages, such as with the Venezuela attack, to heavy cargo, with weight measured in hundreds of kilograms.

A drone would be capable of transporting an improvised explosive device, but this would be less impactful than delivering a chemical or biological payload into a crowded space. Such an attack might have serious lethality consequences, as terrorist organizations well understand, even if they lack operational capability. ISIS propaganda posters have depicted a drone attack on the Eiffel Tower in Paris and in Manhattan.

The terrorist interest in exploiting drone technology is manifested in the Middle East from ISIS drone raids in Iraq and attacks on Saudi targets from the Houthi Islamic militia in Yemen. Terrorists have always been eager to learn from battlefield experience of weaponry. The military battlefield is a traditional testing ground for new terrorist weapons. Drones have been used on the battlefield and what is used on the battlefield will eventually be adapted for terrorist usage. Indeed, terrorist plots have been thwarted that could have involved drone technology. In Manchester, England, an ISIS supporter was developing a drone with the intention of launching a drone attack on an army barracks. However, for a lone actor, there remain significant technical challenges and obstacles in the adaptation of drones for killing people.

22.2.3 Severity of Weapon Attack Modes

The terrorist payoff from an attack depends on the severity of the weapon attack mode. In a tough counter-terrorism environment, the more ambitious a weapon that is selected, the more time, logistical resources and personnel that will be required

to achieve operational functionality. The probability distribution of weapon attack modes has a long severity tail.

For the IRA in their terrorist campaign to bring about a united Ireland, the killing of British soldiers and Ulster constabulary was self-legitimatized by the armed struggle. However, the murder of civilians was disfavoured for political and religious reasons, on both sides of the Irish border. By contrast, Jihadis have absolutely no qualms about mass murder, indeed they have an explicit intent to kill civilians.

On 22 May 2017, a Libyan refugee brought up in Manchester, Salman Abedi, detonated a backpack bomb at the entrance to the Manchester Arena concert hall, after a sell-out concert by the American superstar Ariana Grande. Twenty two of her fans, mostly young girls, were killed. On the morning after the terrorist attack, the UK Prime Minister, Theresa May, declared: '*It is now beyond doubt that the people of Manchester and of this country have fallen victim to a callous terrorist attack, an attack that targeted some of the youngest people in our society with cold calculation*'. The Prime Minister added that, '*Although it is not the first time Manchester has suffered in this way, it is the worst attack the city has experienced and the worst-ever to hit the north of England*.'

Included amongst the terrorist outrages suffered by Manchester was the bombing of the Arndale shopping centre on 15 June 1996. Human lives ultimately matter more to society than a shopping mall. Destroyed buildings can be rebuilt in a way that lives cannot. Part of the cold calculation of Salman Abedi was to choose the optimal target for his terrorist attack: a suicide bomber can only die once. Unlike the IRA bombers, who had multiple opportunities for attacking different targets, and ensured they had escape plans for any operation, suicide bombers have just a single opportunity. So the targeting has to be optimal.

For Islamists 'who love death as you love life', society's pain is the terrorist's gain. The greater the pain of bereavement, the greater is the terrorist's sense of gain. The Islamist predilection for killing in gruesome and barbaric ways causes maximal hurt and distress to the western countries attacked. Terrorism is the ultimate devilish act of *Schadenfreude*: rejoicing in the misfortune and suffering of others. The German philosopher, Arthur Schopenhauer, would have recognized his terminology as characterizing the vengeful mindset of Jihadis.

There have been a number of backpack terrorist bombings against the western alliance since 9/11. Although there have been quite a few Jihadi car bomb plots since then, there has yet to be a successful Jihadi car bomb attack against the western alliance. The nearest miss was the Times Square SUV bomb plot by Faisal Shahzad on 1 May 2010, which failed for technical bomb-making reasons. He slipped through the counter-terrorism net, but the great majority of plots are interdicted by counter-terrorism forces.

Before any massive Jihadi bomb of 2 tons or more is detonated in a major western city, there should be some preparatory warning by way of the prior occurrence of a lesser size vehicle bomb plot, possibly as part of a multiple target bombing attack. Indeed, the vehicle plots which have been interdicted since 9/11 have all been car bomb plots. There have been no truck bomb plots. In the IRA terrorist campaign for a United Ireland, there was a gradual severity progression in the size of plots, ranging

from a small 100 lb car bomb in 1972 to a 3000 lb truck bomb which caused massive damage in Manchester on 15 June 1996.

22.3 CBRN Attacks

The same development time principle for conventional weapons applies to Chemical–Biological–Radiological–Nuclear (CBRN) attacks, which remain an aspiration of Jihadis, but not yet a practical reality. Before any massive CBRN attack, some precursory lesser attack may provide an early warning indicator of increasing terrorist capability and progression on the demanding technical learning curve.

As the anthrax letter scare in Autumn 2001 demonstrated, even a small quantity of anthrax can cause mass terror. The perpetrator of this attack was a bioweapons expert, Bruce Ivins, at the US Army Medical Research Institute of Infectious Diseases. No non-state organization had this dangerous and potent anthrax capability. More generally, only nation states have the technical capability to launch significant chemical, biological or nuclear attacks.

If a terrorist cell has accumulated even a modest quantity of a highly toxic substance, there would be very strong counter-terrorism pressure to deploy it rather than to delay an attack by months to acquire much more. Public fear and mass media coverage would result from even a small CBRN terrorist attack. The law of diminishing returns would apply to the prospective terrorist gain from a more ambitious attack. Operational research methods can quantify the balance between the risk of arrest and the reward of a more potent weapon. Since 9/11, denial of safe terrorist havens for laboratory R&D has meant that not even a minor Jihadi CBRN attack has been witnessed, and there is scant evidence of experimentation and preparation of toxic material.

22.3.1 State-Sponsored Chemical Attacks

In Syria, the Assad regime has used both the nerve agent sarin and chlorine gas as chemical weapons against opponents of the regime. Only nation states have stockpiles of chemical weapons, and these are typically covert in deference to the Chemical Weapons Convention. Here the focus is on state-sponsored terrorism in a foreign country. A notable example of this occurred on 4 March 2018, when a military grade VX nerve agent was deployed on the streets of Salisbury, England.

The target of this chemical poison attack was Sergei Skripal, a former Russian military intelligence officer and MI6 agent. The highest concentration of nerve agent was discovered on the front door of his house. His daughter Yulia who was visiting him from Russia was also contaminated with the lethal nerve agent. The VX nerve agent used was identified by chemical weapons experts at the UK Defence, Science and Technology lab at Porton Down as originating from a group of nerve agents

known as Novichok. These agents were developed in an attempt to circumvent the Chemical Weapons Convention, and engineered to be undetectable by standard equipment. Novichok consists of two separate components that, when mixed, become an active nerve agent, and can be easily deployed using an aerosol, spray, liquid or wipe.

Novichok is not a weapon that can be manufactured by non-state terrorists. It requires the highest-grade state laboratories and expertise. Russia has previously produced this agent; indeed, *Novichok* is a Russian word for 'newcomer'. The likely production facility used to manufacture the agent is in Sarov, a closed town in Russia. As is routine with state-sponsored attacks, Russia categorically denied any involvement, even though only Russia had both the capability and the cogent motive for this chemical attack. Indeed, it is known that a list of around a hundred Russian enemies of the motherland has been drawn up by the Kremlin, and they are deemed to be legitimate targets. The British ambassador to the UN, Jonathan Allen, concluded that it was highly likely that Russia was responsible. Nikki Haley, the US ambassador to the UN, called for immediate action against Russia. The timing of the attack seems to have been chosen two weeks before the 18 May Russian election to boost support for Putin as a tough president.

Prior to collapsing in a catatonic state on a park bench on the afternoon of 4 March 2018, the Skripals had visited the nearby Mill pub and Zizzi Italian restaurant in the centre of Salisbury. Public Health England (PHE) issued advice for those who also had visited these establishments to wash their clothes and belongings, and seal off anything that could not be manually cleaned. However, Dr Vil Mirzayanov, a former Soviet Union chemical weapons scientist who developed Novichok, insisted this was insufficient, asserting that Novichok is so powerful that extremely small doses could remain a danger to public health for years. According to him, hundreds of people could be at risk of suffering possible long-term consequences including headaches and loss of coordination (Deardon and Sharman 2018).

To corroborate this fear, there are suggestions that US veterans Gulf War illness, the symptoms of which are long-lasting, may be related to exposure to low-dose Iraqi chemical warfare agents in the 1991 Gulf War (American Heart Association 2010). Because of the limited long-term experience data on such low-dose nerve gas exposure, opinions are divided over Gulf War illness, and also the outcome of Novichok exposure. Dr Jenny Harries, southern region director at Public Health England noted that PHE had been working very closely with the police and national experts on chemical weapons and that their risk assessment was based on knowledge of the chemical used. Her advice remained that the risk to the general public was low. The advice might have been clarified to state explicitly that the potential adverse outcomes from allowing the public access to potentially hazardous areas were sufficiently unlikely as not to warrant mandatory exclusion orders.

What is the probability distribution of the number of people who are liable to suffer long-term health problems in the years ahead?

Such an important question is all the more challenging for probing the frontier of scientific knowledge. Dr. Jenny Harries had stated that the advice given was based on knowledge of Novichok. Informal elicitation of expert judgement may work

quite well when the elicitation covers the existing domain of knowledge. However, where the time frame for elicitation is beyond practical experience or reasonable extrapolation, a carefully structured and professionally facilitated approach would be preferable.

22.3.2 Bio-Terrorism

Non-state threat actors do not have the technical capability and laboratory facilities to develop biological weapons. However, they can act as human agents to spread a natural contagion. To compound the pervasive political conflict in the Middle East there is the terrorism risk associated with the deliberate malicious spread of a pandemic in western countries. The use of biological weapons by terrorists has a long history, and has an extensive literature. Ever since 9/11, the threat of Al Qaeda using biological weapons has been taken very seriously. Indeed, for counter-terrorism response, it has been the Pentagon that has funded research into the development of vaccines for plague and Ebola and other pathogens that might be weaponized by terrorists.

Biological weapons are attractive to terrorists drawn to becoming bio-martyrs. The millenarian sect Aum Shinrikyo sent a medical team to the Congo in 1993 to investigate the prospects for weaponizing Ebola. This proved too difficult, because Ebola was not highly contagious. Two years later, they launched a sarin gas attack on the Tokyo subway.

With the deployment of any terrorist weapon, the three factors that need to be taken into consideration to gauge the threat are (1) intent; (2) capability; (3) opportunity. The intent by ISIS and other terrorist groups to use infectious disease as a biological disease is clear from their communications. Their capability to develop their own pathogens is minimal. However, if a lethal and transmissible infectious disease were to emerge, terrorist groups would have ample opportunity of spreading the disease wilfully at public gatherings, or on public transportation. Infectious disease propagates along social networks. Terrorists who spread disease maliciously become supernodes in these social networks. The epidemiological consequence of supernodes is to amplify the effective degree of contagiousness of a virus.

The nexus between political conflict and a global pandemic provides a worrying route to disaster. If an epidemic were to emerge in one of the numerous developing regions in a state of political unrest, civil strife or anarchy, the absence of disease surveillance and fragile public health system could well allow the contagion to become established there and then spread abroad to other continents via refugees with little constraint.

Accordingly, a major global pandemic is a systemic financial risk, being coupled with supply chain breakdowns and business disruption, potentially aggravated by the chaos and disorder of political conflict. In 2014, the emerging Ebola crisis might not have been contained if there had been a civil war in West Africa. Counterfactually, the political situation in Sierra Leone and Liberia might have been as unstable as in the

1990s, when there were civil wars in both countries. In 2015, when a million Syrian refugees migrated to Europe, an emerging pandemic disaster might have arisen had there been a more transmissible mutation of the camel-borne Middle East Respiratory Syndrome (MERS). Amongst these refugees, ISIS supporters would have acted as malicious superspreaders of the disease.

A counterfactual question for expert elicitation is as follows: *In 2015, what was the probability distribution for the number of fatalities from MERS?* To address this question, carefully structured elicitation is required, where the facilitator decomposes it into separate contingencies:

(a) What was the probability of MERS mutating in 2015 to become much more contagious between humans? Much is known about the virology of MERS, its spread within camel populations in the Middle East, and transmission from camels to humans. However, there is substantial uncertainty over the likelihood of a dangerous mutation.
(b) Given that there was a dangerous mutation, what was the joint probability distribution of MERS lethality and contagiousness?
(c) For each realization of lethality and contagiousness, what was the impact of ISIS in maliciously spreading the contagion?
(d) Given the impact of ISIS, what was the probability distribution for the number of MERS fatalities in 2015?

22.4 Subjective Expert Judgement Elicitation Methods

The preceding review of terrorism risk provides the technical subject matter background for a discussion of the role of the elicitation of subjective expert judgement. Terrorism is a pervasive risk that needs to be managed by many professional groups: military, police, government, corporations, insurers etc. As discussed above, the military has their own traditional procedures for dealing with threats, which tend to be suited to their own special skills, experience and training, and not to invoke the methods of quantitative risk assessment. The same holds for the police and law enforcement services, who may not even be familiar with qualitative threat matrices. War gaming and battle simulation incorporate some of the basic features of threat assessment and stochastic modelling, without the formal mathematical apparatus of quantitative analysis.

The most promising areas of application involve potential financial risk associated with acts of terrorism. The risk of insolvency is regulated by financial authorities, and corporations need to be able to quantify extreme tail risks, including terrorism risk. In connection with terrorism risk insurance, since 2002, RMS has conducted group elicitation meetings annually in London and Washington DC with leading global terrorism experts, such as Bruce Hoffman and Rohan Gunaratna, with extensive knowledge of terrorism. The classical method of group elicitation was adopted.

Group elicitation meetings are particularly effective, in comparison with individual elicitation methods, because they allow the sharing of information that may

be known only to a subset of the experts in attendance. Apart from confidential information that is not in the public domain, there is restricted classified information that is disseminated only on a need-to-know basis. And even where terrorism information is available from open source material, such material may not necessarily be easy to find, and so may not be familiar to all experts.

These group elicitation meetings have been successful in as much as the terrorism experts have turned out to be well calibrated against what actually transpired. This may be explained by the robustness of the principles governing terrorism risk, which are universal in their domain of applicability. It should be noted that other methods could be tried for eliciting expert judgement from a group of experts, e.g. the Sheffield Elicitation Framework (SHELF) developed by Tony O'Hagan.

There are numerous methods for aggregating expert opinions. The first chapter of this book includes a review. Axiomatic approaches aim to establish an aggregation rule from axioms that the rule should satisfy. Ad hoc approaches have no axiomatic basis, but are proposed with some ex-post justification. One approach that might work well in a terrorism context is a consensus method whereby experts are allowed to interact with each other (Nau 2002) and share information. This is one mode of behavioural aggregation, aimed at generating a greater degree of agreement.

22.5 Terrorism and Political Risk

Terrorism is one manifestation of political conflict. Terrorist campaigns constitute a form of asymmetric warfare, where the terrorist forces are generally far smaller than those of the nation states which they are attacking. A possible exception to the limited capability of terrorist groups is where they are sponsored by a nation state, which provides them with military, economic and technical resources for their terrorist campaigns. Such states include regimes in Iran, North Korea, Somalia, etc. that might be classified by some political risk commentators as failing states.

Whereas terrorism risk is generally bounded by the limited resources of terrorist groups, and persistent counter-terrorism pressure, state-sponsored terrorism risk is limited essentially by international diplomatic pressure, backed up by the threat of direct military conflict. Inevitably, there is a degree of expert judgement in making any risk forecast in the context of military conflict. There are superior methods for eliciting this expert judgement. Important lessons were learned following the intelligence debacle surrounding the 2003 war in Iraq War, where no evidence of weapons of mass destruction could be found, yet senior US intelligence officials remained adamant that Saddam Hussein definitely possessed such powerful weapons.

The massive intelligence failure associated with Iraq War led to a re-evaluation of intelligence assessment methods in Washington, and the establishment in 2006 of the Intelligence Advanced Research Projects Activity (IARPA). The scientific process of randomized control trials can discriminate those with particularly good judgement on political events. Superforecasters can be identified who have special skill in forecasting, as can be measured through a Brier score. It is not necessary

to have years of intelligence experience to be good at forecasting political events. Indeed, many who do have such experience are rather indifferent or poor forecasters. Superforecasters have been identified as having some special traits (Tetlock and Gardner 2016). They are typically numerate, with a technical knowledge of Bayes theorem, even if they may not explicitly make their forecasts doing any actual Bayes theorem calculations. Rather, they edge towards the truth by implicitly following the Bayes principle of updating according to the weight of evidence using their own sense of intuition. For any political conflict risk assessment, explicit use of Bayesian methods, including the construction of Bayesian Belief Networks (BBN), would optimize the forecasts made through progressive updating.

22.5.1 The Trump Card

To paraphrase the German general, Helmuth von Moltke, quoted at the start, 'In the Trump White House, everything is uncertain'. The Prussian military invented board games with dice to introduce an aleatory element. For a board game to begin to represent the challenge of dealing with the Trump White House, the rules of the game themselves would need to include an aleatory element. Imagine playing a game of chess, where the number of squares a piece could move was decided by a dice throw. The game of bridge is the quintessential skilful game of chance where the calculation of probabilities is a decisive advantage in playing strategy. But imagine the chaotic implications in playing a game of bridge where any card could be converted to the trump suit on the throw of dice.

All during the Cold War, the possibility existed of a suitcase nuclear device being planted in Manhattan by an operative of the Soviet Union or other hostile foreign government. Such a risk has always been dealt with capably and effectively by the CIA, who were confident of tracking the flow of communications between the sizeable team planning and executing such a major state-sponsored terrorist attack, and nullifying any plot.

The threat of a nuclear weapon state-sponsored terrorist plot against the US has been a serious cause for concern since 9/11. The Al Qaeda leader, Ayman Al Zawahiri, would have absolutely no qualms in deploying such a fearsome weapon. Since 9/11, until the inauguration of President Trump in January 2017, the most likely source of weapons of mass destruction for a terrorist attack against the US homeland was a rogue state. This threat was of course the rationale for the 2003 war in Iraq to depose Saddam Hussein. The risk of North Korea passing over a nuclear device to a terrorist organization for deployment in the USA has been the subject of numerous political think-tank studies (Bunn et al. 2016), incorporating the elicitation of expert judgement on the nuclear threat over a ten-year time horizon. The hostile intent of the North Korean regime is evident from the proliferation of sophisticated cyber attacks by the notorious Lazarus group, which earns a substantial amount of foreign exchange for the Pyongyang regime. However, looking back on these expert judgements on North Korean state-sponsored terrorism, they have turned out to be excessively pessimistic.

The North Korean prolific testing in 2017 of inter-continental ballistic missiles capable of reaching the USA, materially changed the threat of a state-sponsored attack on USA using weapons of mass destruction. If there had been any external attempt to depose the North Korean leader, the response most likely would have been a military attack on South Korea, or on Guam, Hawaii, or the US mainland, rather than a state-sponsored terrorist attack on the US homeland. In the Autumn of 2017, probabilistic risk analyses were undertaken on behalf of US life and health insurers for the potential number of US casualties in Guam in the event of a nuclear strike.

From the North Korean perspective, the belligerence and volatility of President Trump were also a game-changer. The longstanding cautious western policy of strategic patience reinforced the optimality of Kim Jong-Un's strategy of nuclear weapon development. This was a rational response, geared to maintaining Kim's long-term position as the Supreme Leader of North Korea. However, the abandonment of this policy of strategic patience by President Trump in favour of abrasive aggressive confrontation made it rational for Kim to follow the path of dialogue. This path led inexorably to the Singapore summit meeting on 12 June 2018. Irrespective of the slowness in achieving the agreed objective of denuclearization of the Korean peninsula, the likelihood of North Korea supplying a terrorist organization with a nuclear weapon is greatly reduced, provided the USA keeps to its summit obligations.

22.5.2 Trump Betting

This volatility at the heart of Washington decision-making has been a profitable opportunity for the betting markets. President Trump's rise to power was the biggest non-sports event in betting history. One prominent Irish bookmaker, Paddy Power, hired a head of Trump Betting, whose task was to monitor the administration, updating odds and providing bets.

A parallel book of bets has been kept on Kim Jong-Un, the Supreme Leader of North Korea. Amongst these bets have been wagers on his life coming to an end; being removed from office; being overthrown in a coup or resigning. Such political bets are reminiscent of the exploratory terrorism betting market that DARPA piloted in 2003, before it was shut down and castigated as immoral by congress. Any odds offered on the assassination of any named person might be an illegal inducement for someone to place a bet and then carry out the assassination. Terrorist attacking for financial gain is, however, part of the threat landscape. A popular leading German football team, Borussia Dortmund, was targeted with a bomb attack on 11 April 2017 by a financial trader who hoped to profit from puts he placed on the club's stock price. He left deceptive notes suggesting this was a Jihadi attack.

On 8 August 2017, President Donald Trump warned (CNBC 2017) that threats from North Korea 'will be met with fire and fury like the world has never seen'. Irish bookmaker Paddy Power responded by slashing the odds on the possibility of a cataclysmic conflict in 2017 from 500/1 to 100/1. Bets on a statue of Trump being

erected in North Korea in 2017 had odds of 66/1, while the likelihood of Kim Jong-un staying on as North Korean leader beyond 2031 were put at 4/7 (CITYAM 2017).

One of the purposes of expert elicitation is to facilitate smarter practical decision-making under uncertainty. If Kim Jong-Un had seen the latter odds of his staying in power for at least another 14 years, or himself commissioned an expert elicitation, he would have realized it was advisable to meet with President Trump. If his policy is America First, President Kim's policy is self-survival, and his policy choices would be those that gave the young dictator a high chance (>90%) of reaching the age of fifty in his presidential office.

In the aftermath of the Singapore Summit, the odds of Kim Jong-Un's survival would have been greatly boosted. This may be inferred from the comparatively short odds of 10:1 soon quoted by PaddyPower on North Korea hosting the Olympic Games before the end of 2040. No country can host the Olympic Games without massive infrastructure expenditure. These short odds reflect the plausibility and promise of major inward investment in the coming two decades, coinciding with potential denuclearization of the Korean peninsula.

In September 2017, the 2024 and 2028 Olympics were awarded to Paris and Los Angeles, respectively, after Tokyo in 2020. In that September, if there had been an expert elicitation on the Olympic Games venues in 2032, 2036 and 2040, the odds of North Korea being selected would have been those for a rank outsider—on economic and infrastructure grounds alone. But as perceived in the immediate aftermath of the Singapore Summit, the odds of the infrastructure investment and development being sufficient by 2032 for North Korea to host the Olympics might be as good as 5:1. Assuming five cities bid for each of the 2032, 2036 and 2040 Games, and that Pyongyang, North Korea, bids each time, the chance of winning one of the awards is about one-half. This yields the overall odds of North Korea hosting the Olympic Games before the end of 2040 at about 10:1, as quoted by PaddyPower after the Singapore Summit.

22.5.3 Expert Political Judgement on the Middle East

The Trump Presidency challenge for the US State Department has been immense and unprecedented. In an interview with the LA Times (2017), Nicholas Burns, a senior State Department official noted that Trump's policy in his first year of office was a radical departure from every president since WWII. The most recent example of US isolation came with Trump's decision to formally recognize Jerusalem as the capital of Israel, reversing decades of international consensus. On Monday, 14 May 2018, the US embassy in Jerusalem was opened, amidst mass protests on the Gaza–Israel border.

The impact on Middle Eastern terrorism of this breach of international consensus is potentially one of the most significant questions on terrorism risk. It seems very unlikely that any formal attempt was made within the White House to gauge the terrorism costs of recognizing Jerusalem as the capital of Israel. This was an uncosted

campaign promise. Ex-post, risk stakeholders representing US interests and citizens both at home and abroad must have been assessing potential terrorism consequences. This is a clear threat: on 15 January 2019, the Islamist militant group Al-Shabaab attacked a hotel and office complex in Nairobi, claiming that it was a response to the US recognition of Jerusalem as the capital of Israel.

Group decision conferencing is the traditional framework for terrorism assessment. However, it would be interesting to compare this with a calibrated expert judgement approach. As a reminder of the practical importance of such an exercise in the context of the US recognition of Jerusalem as the capital of Israel, it should not be forgotten that the first attack on the World Trade Center in Manhattan on 26 February 1993 was perpetrated by Ramzi Yousef, who was motivated by the cause of Palestine.

A characteristic of terrorism risk is that the spectrum of expertise is very broad, covering those who have a deep knowledge of terrorist modus operandi and history, such as the 1993 WTC attack. There are experts who have known key members of terrorist organizations; those who may have been members or sympathizers in the past; those who have worked in the intelligence or security services; and those who know or have interviewed currently active terrorists. Just as criminologists interview criminals in prison, terrorism analysts also interview terrorists in prison. The opportunities expanded with the Islamist threat. Between 2002 and 2016, with the rise of militant Islam, the proportion of Muslims in the UK prison population doubled. Williams (2018) noted that more than 40% of the prisoners in the high-security prison he worked in were Muslim.

Open source information, such as provided by Jihadi online publications, also provide valuable insight for terrorism experts, who can infer recommended attack strategies, and the principal drivers of terrorism risk. The large variability in the breadth and depth of terrorism expertise argues against any elicitation procedure that weights experts equally, or treats as equal the opinions of participants in a group decision conference.

22.5.4 Iran

The Joint Comprehensive Plan of Action (JCPOA) is an international agreement on the nuclear programme of Iran eventually reached in Vienna on 14 July 2015, between Iran, the P5+1 (the five permanent members of the United Nations Security Council—China, France, Russia, UK, USA—plus Germany) and the European Union.

President Trump's intense dislike of JCPOA, negotiated during the Obama presidency, presented some major challenges for political pundits forming their expert judgements on the Iranian response to the US withdrawal from JCPOA. Three principal policy options were open to Iran (dispute, leave or continue), and Iranian officials would have been able to offer estimates of the likelihood that each would have been pursued. Under the Chatham House rule, these chances could be obtained

through the participation of knowledgeable Iranian officials. Indeed, at a London lecture at Chatham House itself, a question was raised as to what the most likely option might be. Ayatollah Ali Khamenei, previously issued a fatwa against the development of nuclear weapons. This religious ruling would suggest that nuclear terrorism would not be an outcome, whichever option was taken. However, this dogmatic position may be over-ruled by pragmatic Iranian politicians.

Of particular methodological interest is how a formal elicitation of Iranian political pundits would fare by comparison with those with real inside knowledge from Tehran. Unlike elicitations relating to natural or environmental hazards, the answers would actually be known to insiders. Questions where the answers are known might be usefully employed as calibration seeds for a structured elicitation using Cooke's method (Cooke 1991).

The opportunity has not yet arisen for a practical application of Cooke's method to an actual real-time political risk crisis. This exercise might avoid the systematic groupthink associated with traditional decision conferencing, which is liable to be distorted in favour of those who are the most opinionated, have the most forceful personalities, and speak loudest; traits not entirely disassociated from the Trump White House. But whatever the approach taken to elicit expert judgement, Sunstein (2019) draws a lesson from counterfactual analysis that small shifts or nudges can produce massive political changes, such as the 1979 Iranian revolution, which was unforeseen, like the Arab Spring.

References

American Heart Association. (2010). Low-dose exposure to chemical warfare agent may result in long-term heart damage. *Science News*. https://www.sciencedaily.com/releases.htm.

Awan, A. N. (2016). The impact of evolving Jihadist narratives on radicalization in the west. In S. Staffell & A. N. Awan (Ed.), *Jihadism Transformed*. London: Hurst & Co.

Banks, D. L., Aliaga, M. R., Insua, D. R. (2015). *Adversarial risk analysis*. CRC Press.

Bunn, M., Malin, M. B., Roth, M., Tobey, W. H. (2016). *Preventing nuclear terrorism*. Harvard University: Belfer Center for science and international affairs report.

Camerer, C. (2003). *Behavioral game theory*. Princeton, NJ: Princeton University Press.

CNBC. (2017). Trump's fire and fury speech. https://www.cnbc.com/2017/08/08/trump-warns-north-korea-threats-will-be-met-with-fire-and-fury.html.

CITYAM. (2017) http://www.cityam.com/270141/paddy-power-slashes-odds-world-ending-year-north-korea.

Cooke, R. M. (1991). *Experts in uncertainty*. Oxford: Oxford University Press.

Coopersmith, J. (2017). *The lazy universe*. Oxford: Oxford University Press.

Deardon, L., & Shardon, J. (2018). Russian spy attack. *Independent*.

Gallagher, C. (2018). *Telling it as it wasn't*. University of Chicago Press.

Harding, L. (2014). *The Snowden files*. London: Guardian Books.

LA Times. (2017, December 26). Trump claims he's boosting U.S. influence, but many leaders see America in retreat. http://www.latimes.com/nation/la-fg-trump-us-influence-20171226-story.html.

Nau, R. F. (2002). The aggregation of imprecise probabilities. *Journal of Statistical Planning and Inference, 105*(1), 265–282.

McNeilly, M. (2001). *Sun Tzu and the art of modern warfare.* Oxford: Oxford University Press.
Rauf, F. A. (2015). *Defining Islamic statehood*. Basingstoke: Palgrave Macmillan.
Rios, J., & Rios, Insua D. (2012). Adversarial risk analysis for counterterrorism modelling. *Risk Analysis, 32*(5), 894–915.
Rios, Insua D., Rios, J., & Banks, D. (2009). Adversarial risk analysis. *Journal of the American Statistical Association, 104*(486), 841–854.
Silber, M. (2012). *The Al Qaeda factor*. Philadelphia: University of Pennsylvania Press.
Sunstein, C. R. (2019). *How change happens*. Cambridge, MA: MIT Press.
Tetlock, P., & Gardner, D. (2016). *Superforecasting*. London: Random House books.
Williams, R. (2018). Muslims leaving prison talk about the layers of their lives. *Horizons* 36.
Werner, C. (2019). This volume.
Woo, G. (2011). *Calculating catastrophe.* Imperial College Press.
Woo, G. (2015). *Principles of terrorism risk modelling from Charlie Hebdo.* Ankara: Defence Against Terrorism Review.