A Conceptual Model to Identify Intent to Use Chemical-Biological Weapons

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Abstract

This paper describes a conceptual model to identify and interrelate indicators of intent of non-state actors to use chemical or biological weapons. The model expands on earlier efforts to understand intent to use weapons of mass destruction by building upon well-researched theories of intent and behavior and focusing on a sub-set of weapons of mass destruction (WMD) to account for the distinct challenges of employing different types of WMD in violent acts. The conceptual model is presented as a first, critical step in developing a computational model for assessing the potential for groups to use chemical or biological weapons.

Introduction

Proliferation and use of weapons of mass destruction (WMD), most commonly defined as chemical, biological, radiological, and nuclear (CBRN) devices are grave threats to United States (US) national security.[1] Although several domestic and international terrorists and terrorist groups have communicated their intent to acquire and use WMD including nuclear weapons, explosives have been the weapon of choice.[2] An ongoing concern is identifying indicators that an existing or emerging terrorist group intends to expand its arsenal to include CBRN weapons.

The apparent preference for conventional weapons (explosives) by violent groups is understandable. Explosives are a proven technology with known outcomes, generally require only basic knowledge of chemistry and relatively easy-to-obtain materials and instructions to manufacture, and can be acquired through criminal and other networks. They have the additional benefit of creating a significant visual and psychological impact beyond damage or destruction of their target. In contrast, WMD are more difficult to manufacture, acquire, and use, and their outcomes are less certain.[3] However, opportunities may arise that significantly reduce the

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[1] Although explosives have been included in some definitions of WMD, for example, the definition used by the Federal Bureau of Investigation which includes any explosive or incendiary (bomb, grenade, rocket having an explosive or incendiary charge of more than four ounces, missile having an explosive or incendiary charge of more than one-quarter ounce, mine of device similar to any of the devices described), they are considered conventional weapons not requiring the same type of prohibitions as CBRN for use in state-on-state armed conflicts. US Department of Defense, "Joint Publication 1-02" in *DoD Dictionary of Military and Associated Terms,* vol. 14, November 8, 2010 (as amended through February 15, 2016), (Arlington, VA: US Department of Defense, 2010), available at: https://fas.org/irp/doddir/dod/jp1_02.pdf; United Nations Security Council Commission for Conventional Armaments: Resolutions Adopted by the Commission at Its Thirteenth Meeting, August 12, 1948, and a Second Progress Report of the Commission (New York, NY: United Nations, 1948), available at: *http://repository.un.org/handle/11176/332321?show=full*; As quoted in United Nations. 2012. *The United Nations and Disarmament, 1945–1965.* UN Publication A/67; L.28. New York, NY: United Nations Office of Public Information. US Congress, "Use of Weapons of Mass Destruction," in *18 U.S.C. 2332a* (Washington, D.C.: US Government Publications Office, 2011); NSPD-17/HSPD 4, "National Strategy to Combat Weapons of Mass Destruction," December 2002 (unclassified version), available at: https://fas.org/irp/offdocs/nspd/nspd-17.html.

[2] Federal Bureau of Investigation. *Weapons of Mass Destruction.* Last modified 2017. *https://www.fbi.gov/about-us/investigate/terrorism/wmd/wmd_faqs*; Gary A. Ackerman, *More Bang for the Buck: Examining the Determinants of Terrorist Adoption of New Weapons Technologies* (London, UK: King's College, 2014), available at: https://kclpure.kcl.ac.uk/portal/en/theses/more-bang-for-the-buck-examining-the-determinants-of-terrorist-adoption-of-new-weapons-technologies(992afd2a-bdeb-46b2-8cb7-cd29d77ebd64).html; McCormick, "Terrorist Decision Making," 473-507.

[3] James JF Forest, "Framework for Analyzing the Future Threat of WMD Terrorism," Journal of Strategic Security 5, no. 4 (2012): 51, available at: http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1193&context=jss.

challenges of acquiring WMD, such as discovery of a state actor's cache of chemical or biological weapons. For example, roadside bombs used against US forces in Iraq in 2003 contained Iraqi-produced chemical weapons abandoned after the Iran-Iraq war two decades earlier.[4]

The challenges WMD pose for non-state actors suggest that factors different from those associated with conventional weapons are likely to affect consideration of WMD as part of a terrorist group's strategy. As advances in science and technology further reduce obstacles to successful execution of a WMD attack, it is increasingly important to understand why a group would commit to acquisition or production and use of WMD and what indicators would signal movement toward such a commitment.

Chemical and biological weapons are sufficiently different from radiological and nuclear weapons to warrant separate analysis. For example, compared with radiological and nuclear devices or weapons, chemical and biological agents and weapons are easier to conceal, the materials needed to produce them are relatively easier to acquire, and a chemical or biological weapons (CBW) program requires less financing and expertise to establish.[5] The knowledge required to perform biological and chemical science also shares more in common than that required for radiological and nuclear science, which may have implications for recruitment and efficient application of expertise. Like radiological or nuclear weapons, even low concentrations of CBW can create panic and fear.[6] However, because discovery of a chemical, biological, or radiological attack may not occur immediately, heightened panic and fear about the spread of the agent or material can ensue.[7] Previous analyses of attempts to acquire or use CBW—while useful—have not resulted in a practical framework to identify indicators that a group may present a high risk for

[4] Eric Schmitt, "ISIS Used Chemical Arms at Least 52 Times in Syria and Iraq, Report Says," *New York Times*, November 21, 2016, accessed January 24, 2017.
[5] NATIBO, "Biological Detection System Technologies Technology and Industrial Base Study: A Primer on Biological Detection Technologies," in *Book Biological Detection System Technologies Technology and Industrial Base Study: A Primer on Biological Detection Technologies*, (City: North American Technology and Industrial Base Organization, 2001); Andrea A. Nehorayoff, Benjamin Ash, and Daniel S. Smith, "Aum Shinrikyo's Nuclear and Chemical Weapons Development Efforts," *Journal of Strategic Security* 9, no. 1 (2016): 35-48, available at: *http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1510&context=jss.*
[6] K. Ganesan, S.K. Raza, and R. Vijayaraghavan, "Chemical Warfare Agents," *Journal of Pharmacy and Bioallied Sciences* 2, no. 3 (2010): 166, available at: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3148621/.*
[7] There is an incubation period for biological agents (G.G. Onishchenko et al., "Bioterrorism: A National and Global Threat," *Herald-Russian Academy of Sciences C/C of Vestnik-Rossiiskaia Akademiia Nauk* 73, no. 2 (2003): 127-35, as excerpted in Appendix D of *Proceedings of Terrorism: Reducing Vulnerabilities and Improving Responses: U.S. - Russian Workshop Proceedings*. Washington, D.C.: The National Academies Press (2004).

acquiring and using CBW.[8] This article presents a framework for CBW intent–a CBW Intent Model.

Previous Use of CBW by Individuals and Groups

Chemical or biological weapons are not a recent phenomenon. As early as 1000 BC, the Chinese used arsenic smoke against enemies. Both World Wars saw experimentation and use of chemical and biological weapons (for example, WWI: Germany's use of anthrax to infect Russian horses, chlorine and mustard gas use by Germany early in the war and by Britain late in the war; WWII: Japan's experimentation with and use of cholera and other biological agents against Chinese cities).[9]

With few exceptions, CBW also are generally not the sole weapon considered by a group. Aum Shinrikyo, an apocalyptic religious sect that released sarin gas in the Tokyo subway in 1995, tried unsuccessfully to acquire and manufacture nuclear weapons and researched other weapon technologies such as lasers and microwaves while running chemical and biological weapons programs.[10] The arsenals of armed militia groups in the United States have included both conventional weapons (for example, assault rifles and bombs) and CBW (ricin by the Minnesota Patriots Council; potassium cyanide by The Covenant, the Sword, and the Arm of the Lord).[11] Attacks perpetrated by the Islamic State of Iraq and al-Sham

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[8] Jerrold M. Post, "Group and Organizational Dynamics of International Terrorism: Implications for Counterterrorist Policy," in *Contemporary Research on Terrorism*, eds. Paul C. Wilkinson and Alaisdair M. Stewart, (Aberdeen, Scotland: Aberdeen University Press, 1987); Jerrold M. Post, Keven G. Ruby, and Eric D. Shaw, "The Radical Group in Context: 1. An Integrated Framework for the Analysis of Group Risk for Terrorism," *Studies in conflict and terrorism* 25, no. 2 (2002): 73-100, available at: *http://www.tandfonline.com/doi/abs/10.1080/105761002753502475;* Jonathan B. Tucker and J. Pate, "The Minnesota Patriots Council (1991)," in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan B. Tucker (Cambridge, MA: The MIT Press, 2000).

[9] Gerard J. Fitzgerald, "Chemical Warfare and Medical Response During World War I," American Journal of Public Health 98, no. 4 (2008): 611-25, available at: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2376985/;* Thomas J. Johnson, "A History of Biological Warfare from 300 B.C.E. to the Present," American Association for Respiratory Care, available at: *http://www.zarcommedia.com/index.php/research-documents/13014.html;* Jeffrey K. Smart, "History of Chemical and Biological Warfare: An American Perspective," in Medical Aspects of Chemical and Biological Warfare, chap. 2, eds. Frederick R. Sidell, Ernest T. Takafuji, and David R. Franz (Washington, D.C.: TMM Publications, 1997), available at: *http://www.au.af.mil/au/awc/awcgate/medaspec/ch-2electrv699.pdf*; C.N. Trueman, "Chemical Warfare and World War Two," in The History Learning Site, accessed May 30, 2016, available at: *http://www.historylearningsite.co.uk/world-war-two/chemical-warfare-and-world-war-two-2/*.

[10] David E. Kaplan, "Aum Shinrikyo (1995)," in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan B. Tucker (Cambridge, MA: MIT Press, 2000).

[11] Ackerman, *More Bang for the Buck*; Tucker and Pate, "The Minnesota Patriots Council (1991)"; Jessica E. Stern, "The Covenant, the Sword, and the Arm of the Lord

(ISIS) have included chlorine gas and mustard gas as well as advanced conventional weapons (for example, assault rifles, surface-to-surface rockets, anti-tank and anti-aircraft guided weapons).[12]

CBW are also often instrumental to achieving specific objectives for which they are especially well-suited, such as targeting individuals or debilitating but not necessarily killing victims. They have been used for both political and criminal purposes. For example, ISIS used CW to slow down and demoralize Iraqi forces advancing on Mosul, the Rajneeshees contaminated food at several restaurants to affect the outcome of a local election, VX agent was used to murder Kim Jong-Nam, a disgruntled employee poisoned the food of his co-workers, and ricin was used to murder a Bulgarian and in an attempt by an individual to poison a spouse in a child custody battle.[13]

Although individuals have perpetrated many of the documented attacks using chemical or biological (CB) agents, groups are the focus of the model. So-called lone wolf attacks are more likely to have a criminal purpose such as extortion or revenge and be one-time events.[14] Groups are more likely to have access to the resources needed to develop an organic CB capability. Because groups have at least two members, there are also more opportunities to observe indicators or *trip wires* such as expertise of group members, intercept communications, or infiltrate the group.[15]

(1985)," in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan B. Tucker (Cambridge, MA: MIT Press, 2000).

[12] Raja Abdulrahim, "Islamic State Accused of New Chemical Weapons Attack in Syria," Wall Street Journal (2015), available at: *https://www.wsj.com/articles/islamic-state-accused-of-using-chemical-weapons-in-syria-1440353562*, "Conflict Armament Research, Dispatch from the Field: Islamic State Weapons in Kobane" (London, UK: Conflict Armament Research LTD, 2015), available at: *http://www.conflictarm.com/wp-content/uploads/2015/04/Islamic_State_Weapons_in_Kobane.pdf*; Schmitt, "ISIS Used Chemical Arms"; Kristina Wong, "ISIS Used Chemical Weapons against the Kurds, U.S. Officials Say," The Hill (2016), available at: *http://thehill.com/policy/defense/269551-isis-used-chemical-weapons-against-the-kurds-us-officials-say*; Barbara Starr and Nicole Gaouette, "U.S. Bombs ISIS chemical weapons plant," CNN Report, September 13, 2016, available at: *http://www.cnn.com/2016/09/13/politics/isis-chemical-weapons-plant/*.

[13] "Kim Jong-Nam death: Two women charged with murder," *BBC News.com*, accessed March 1, 2017, available at: *http://www.bbc.com/news/world-asia-39124439*; Schmitt, "ISIS Used Chemical Arms"; W. Seth Carus, "The Rajneeshees (1984)," in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan B. Tucker (Cambridge MA: MIT Press, 2000); W. Seth Carus, "Bioterrorism and Biocrimes: The Illicit Use of Biological Agents Since 1900," (Working Paper, February 2001 Revision. Washington, D.C.: Center for Counterproliferation Research, National Defense University, 2001), available at: *https://fas.org/irp/threat/cbw/carus.pdf*.

[14] Carus, "Bioterrorism and Biocrimes."

[15] Patrick D. Ellis, "Lone Wolf Terrorism and Weapons of Mass Destruction: An Examination of Capabilities and Countermeasures," *Terrorism and Political Violence* 26, (2014): 211-225.

Previous examinations of chemical and biological weapons use cases have suggested several underlying factors that could indicate openness or intent of a group to include CBW as part of its arsenal:[16]

- Little or no concern over public opinion about a group's tactics or results
- History of violence resulting in high casualties; an escalatory pattern of violence
- Sophistication or innovation in weapons or tactics
- Willingness to take risks
- Charismatic leadership
- Sense of paranoia and grandiosity
- Defensive aggression
- Ideology supporting use of unconventional weapons or tactics to accomplish group goals (apocalyptic, religious).

Because previous work did not provide an organizing framework for the factors nor analyze comparable groups that did not attempt to acquire or use CBW, these factors have unknown diagnostic use for distinguishing between groups inclined or not inclined toward use of CBW. For example, charismatic leadership is often a valued characteristic in non-terrorist groups and organizations. Additionally, personal attributes, such as charismatic leadership or paranoia and grandiosity, are difficult to identify correctly without specialized training, a broad range of data from extended observations or measurement, or both.[17] Moreover, individuals may express the same attribute in several ways. Paranoid individuals, for example, can be stubborn and argumentative or aloof and withdrawn. An organizing framework should improve identification of intent to acquire and use CBW.

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[16] Reviews include a 1994 study of incidents of CBW terrorism in 26 countries since World War I (Harvey J. McGeorge, "Chemical and Biological Terrorism: Analyzing the Problem," The ASA [Applied Science & Analysis] *Newsletter* 42 (1994): 1, 13-4). (As cited in M. Leitenberg, "An Assessment of the Biological Weapons Threat to the United States," White Paper prepared for the Conference on Emerging Threats Assessment: Biological Terrorism, Institute for Security Technology Studies, Dartmouth College, Hanover, NH. pp. 7-9. 2000), available at: *http://www.equipped.org/bioterror_leitenberg.htm*, in-depth historical case studies of 12 groups or individuals who sought to acquire or used CBW agents between 1945 and 1998; Jonathan B. Tucker, "Lessons from the Case Studies," in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan B. Tucker (Cambridge, MA: The MIT Press, 2000), and a comprehensive survey of all known instances of bioterrorism incidents between 1900 and 1990; Carus, "Bioterrorism and Biocrimes."

[17] David C. Funder, "Personality," Annual Review of Psychology 52 (2001): 197-221, available at: *http://www.annualreviews.org/doi/pdf/10.1146/annurev.psych.52.1.197.*

Development of the Model

Development of the CBW Intent Model relied on research on terrorism and violence, case studies, reviews of known and suspected use cases, and scientific models of behavior and intent. Reviews of research on terrorism, political and criminal violence, the ideology and dynamics of terrorist groups, radicalization, and group organizational processes that support terrorist operations provided a foundation for understanding the motivations of individuals and groups, and the circumstances associated with terrorism and with attempted and actual use of CBW.[18]

Two theories from social and organizational psychology–the Theory of Planned Behavior and Expectancy Theory–inform the model.[19] These theories hold that choice among behavioral alternatives–such as use of violence and type of weapons–is influenced by beliefs related to available behavioral alternatives and the expected consequences of attempting and executing the behaviors.[20]

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[18] Ackerman, *More Bang for the Buck*; McCormick, "Terrorist Decision Making," 473-507; Post, Ruby, and Shaw, "The Radical Group in Context"; Maya Beasley, "Terrorism as Social Movement Tactic Theory, Mobilization" in *Protecting the Homeland from International and Domestic Terrorism Threats: Current Multi-Disciplinary Perspectives on Root Causes, the Role of Ideology, and Programs for Counter-Radicalization and Disengagement, Multi-Disciplinary White Papers in Support of Counter-Terrorism and Counter-WMD*, eds. Laurie Fenstermacher et al. (Wright-Patterson AFB, USA: Multi-Agency and Air Force Research Laboratory, 2010); Martha Crenshaw, "The Causes of Terrorism," *Comparative Politics* 13, no. 4 (1981): 379-99; Murat Ozer, "The Impact of Group Dynamics on Terrorist Decision Making," in *Understanding Terrorism: Analysis of Sociological and Psychological Aspects* (Amsterdam Netherlands: IOS Press, 2007); Benjamin Ginsberg, "Why Violence Works," *The Chronicle of Higher Education* (2013); John Horgan, "Discussion Point: The End of Radicalization?," University of Maryland September 28, 2012, available at: *http://www.start.umd.edu/news/discussion-point-end-radicalization*; Clark McCauley and Sophia Moskalenko, "Individual and Group Mechanisms of Radicalization," in *Protecting the Homeland from International and Domestic Terrorism Threats: Current Multi-Disciplinary Perspectives on Root Causes, the Role of Ideology, and Programs for Counter-Radicalization and Disengagement*, eds. Laurie Fenstermacher et al. (Wright-Patterson AFB, USA: Multi-Agency and Air Force Research Laboratory, 2010); Gordon H. McCormick and Guillermo Owen, "Security and Coordination in a Clandestine Organization," *Mathematical and Computer Modelling* 31, no. 6 (2000): 175-92; Marc Sageman, "Small Group Dynamics," in *Protecting the Homeland from International and Domestic Terrorism Threats*, eds. Laurie Fenstermacher et al. (Wright-Patterson AFB, USA: Multi-Agency and Air Force Research Laboratory, 2010).

[19] Icek Ajzen, "The Theory of Planned Behavior," *Organizational Behavior and Human Decision Processes* 50, no. 2 (1991): 179-211; Icek Ajzen and Martin Fishbein, "Attitude-Behavior Relations: A Theoretical Analysis and Review of Empirical Research," *Psychological Bulletin* 84, no. 5 (1977): 888-918; Victor H. Vroom, *Work and Motivation* (New York, NY: Wiley, 1964).

[20] The definition of rationality varies across different disciplines. The most common definition is from economics and arises from the Theory of Rational Choice which holds that individuals make choices that maximize utility without the constraints of time or effort (Howard Rachlin, "Rational Thought and Rational Behavior: A Review of Bounded Rationality: The Adaptive Toolbox," *Journal of the Experimental Analysis of Behavior* 79, no. 3 (2003): 409-12). Bounded rationality was proposed to account for the frequent observation that humans often rely on heuristics to satisfice rather than maximize utility given constraints on time and effort (Herbert A. Simon,

In the Theory of Planned Behavior intention is the immediate precursor of behavior, and intention follows from "beliefs about [a] behavior's likely consequences (perceived outcomes), about normative expectations of important others (social/group norms), and about the presence of factors that control behavioral performance (moderating factors)."[21] In Expectancy Theory, behavior follows from the expectation of reward associated with choices among alternatives.[22] Intent to perform a specific behavior is based on the expectancy (belief) that a level of effort will lead to the intended performance (perceived capability), the perceived instrumentality of the performance to achieve a desired outcome (instrumental to the desired end), and the desirability of the outcome (end state value). These principal components of the two theories are, in turn, affected by background factors such as overarching beliefs, values or goals, individual characteristics such as intelligence, religion, experience, culture, knowledge, and external factors such as opportunity and resources.

The CBW Intent Model builds upon the principal components and background factors that comprise the Theory of Planned Behavior and Expectancy. It proposes that the intent of non-state actors to use violence, commit terrorist acts, and employ specific tactics and weapons is a choice among behavioral alternatives.[22] The choice can have a rational basis—to achieve an objective—or can represent a means of self-expression.[23] Once

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"Rational choice and the structure of environments," *Psychological Review* 63 (1956): 129-138.) The use of rationality in the discussion here comes from psychological science which defines a rational decision as a deliberative or planned versus emotional one based on perceptions or beliefs versus "facts." (Ajzen, "The Theory of Planned Behavior," 179-211; see also Arie W. Kruglanski, "The Psychology or Terrorism: 'Syndrome' Versus 'Tool' Perspectives," Paper presented at the NATO Advanced Research Workshop on Social and Psychological Factors in the Genesis of Terrorism, Castelvecchio, Pascoli, Italy, September 14-18, 2005), and which corresponds to the notion of bounded rationality. Both disciplines recognize that decisions based on cognitive effort may not necessarily be, or appear, logical.
[21] Ajzen, "The Theory of Planned Behavior," 438.
[22] McCormick, "Terrorist Decision Making,"473-507.
[23] A similar distinction between terrorism as an emotional or a rational behavior was discussed by Arie W. Kruglanski in "The Psychology or Terrorism: 'Syndrome' Versus 'Tool' Perspectives." From a psychological analysis, terrorism can be viewed within a medical (disease) model as a "syndrome" with internal causes—such as personality traits that predispose an individual to become a terrorist—and external causes, such as disadvantaged status of one's ethnic, religious or other group or political oppression. It can also be viewed as a "tool," one of several means by which to achieve a goal. The model presented in this article deals primarily with rational decisions to use violence and CB weapons to achieve objectives rather than the factors underlying violence as a form of self-expression. There is evidence that the motivation of some al-Qaeda operatives to attack the United States and the West is based in Islamist ideology, which directs adherents to wage jihad against takfir (nonbelievers and non-Muslim governments) (Erick Stakelbeck, *The Terrorist Next Door: How the Government Is Deceiving You About the Islamist Threat* (New York, NY: Regnery Publishing, 2011)). However, a more in-depth exploration of the psychological factors

the decision to engage in violence is made, options exist regarding how actors express the violence.[24] Individual, social, and political factors—including those represented in the Theory of Planned Behavior and Expectancy Theory—social interaction processes, and available resources (human, financial, logistical) influence and shape the options selected.[25] The CBW Intent Model incorporates individual influence through group leaders, group dynamics, organizational processes, opportunity, and openness to novel ideas and technology.[26] Knowledge of common factors underlying behavioral choices and terrorist behavior should improve identification of factors unique to the propensity to use violence and unconventional weapons such as CBW. It should also signal when there is increased risk of a non-violent group becoming violent and opting for CBW.

Radicalization is often a key antecedent of terrorism.[27] However, while extreme beliefs may precede violent behavior, not all who hold radical or

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related to violent behavior as self-expression is beyond the current scope of this work. McCormick, "Terrorist Decision Making," 473-507.

[24] Ginsberg, "Why Violence Works"; Gary A. Ackerman, Victor Asal, and R. Karl Rethemeyer, "Toxic Connections: Terrorist Organizational Factors and the Pursuit of Unconventional Weapons," in START Research Review 2009, eds. Gary A. Ackerman and Matthew Rhodes (College Park, MD: National Consortium for the Study of Terrorism and Responses to Terrorism), available at: *http://www.tandfonline.com/doi/abs/10.1080/1057610X.2012.648156*.

[25] Luis de la Corte, "Explaining Terrorism: A Psychosocial Approach," *Perspectives on Terrorism* 1, no. 2 (2010), available at: *http://www.terrorismanalysts.com/pt/index.php/pot/article/view/8/html*.

[26] Daniel C. Feldman, "The Development and Enforcement of Group Norms," *Academy of Management Review* 9, no. 1 (1984): 47-53, available at: *doi: 10.5465/AMR.1984.4277934*; Verlin B. Hinsz and James H. Davis, "Persuasive Arguments Theory, Group Polarization, and Choice Shifts," *Personality and Social Psychology Bulletin* 10, no. 2 (1984): 260-8, available at: *http://journals.sagepub.com/doi/pdf/10.1177/0146167284102012*; Irving L. Janis and Leon Mann, *Decision Making: A Psychological Analysis of Conflict, Choice, and Commitment* (New York, NY: The Free Press, 1977); Serge Moscovici and Marisa Zavalloni, "The Group as a Polarizer of Attitudes," *Journal of Personality and Social Psychology* 12, no. 2 (1969): 125; Wendy Wood, "Attitude Change: Persuasion and Social Influence," *Annual Review of Psychology* 51, no. 1 (2000): 539-70, available at: *http://www3.psych.purdue.edu/~willia55/392F-'06/Wood-Influence.pdf*; Renate Mayntz, "Organizational Forms of Terrorism: Hierarchy, Network, or a Type Sui Generis?" MPIfG Discussion Paper [Electronic], (2004), available at: *http://pubman.mpdl.mpg.de/pubman/faces/viewItemOverviewPage.jsp?itemId=es cidoc:1234217*; Henry Mintzberg, *The Nature of Managerial Work* (New York, NY: Harper & Row, 1973).

[27] Randy Borum, "Understanding the Terrorist Mindset," *FBI Law Enforcement Bulletin* 72(2003): 7-10, available at: *http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1227&context=mhlp_f acpub*. Clark McCauley and Sophia Moskalenko, "Mechanisms of Political Radicalization: Pathways toward Terrorism," *Terrorism and Political Violence* 20, no. 3 (2008): 415-33, available at: *http://www.tandfonline.com/doi/full/10.1080/09546550802073367*.

extremist beliefs will engage in violent behavior or terrorism.[28] The CBW Intent Model does not explicitly include radicalization as a factor, but incorporates several key factors identified as contributing to or indicative of radicalization toward violence.

Antecedents common to radicalization and terrorism include humiliation of self or one's group, a personal connection to a grievance, perceived injustice toward the group one identifies with, and dissatisfaction with the status quo of political activism.[29]

Overview of the CBW Intent Model

The CBW Intent Model is divided into two sections to distinguish between factors related to intent to use violence (general violence) and factors related to using CB agents or weapons to commit violence (CB violence). Just as not all non-violent groups will become violent, not all violent groups will choose WMD, and specifically CBW, to commit violent acts. However, all groups that use CBW have opted for violence to reach their objectives. While analysts may be less concerned about a previously non-violent group moving toward violence, they need to distinguish groups moving toward violence using CBW from groups opting for conventional weapons.

Figure 1 shows the composite and individual factors or indicators in the model as they relate to individual, group, and organizational processes, and external influences on the decisions of a group to use violence and specifically CB violence. It also shows the connection between model indicators and the Theory of Planned Behavior and Expectancy Theory.[30] None of the composite and individual indicators alone is likely to confirm CBW intent. However, observation over time of multiple indicators that are consistent with the components of the Theory of Planned Behavior or Expectancy Theory and the CBW Intent Model may signal increased risk for a group to choose violent behavior to achieve its objectives and CBW as the means.

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[28] John Horgan, "Discussion Point: The End of Radicalization?"; Clark McCauley and Sophia Moskalenko, "Understanding Political Radicalization: The Two-Pyramids Model," *American Psychologist* 72, no.3 (2017): 205-216, available at: *http://dx.doi.org/10.1037/amp0000062*.
[29] Arie W. Kruglanski and Shira Fishman, "Psychological Factors in Terrorism and Counterterrorism: Individual, Group, and Organizational Levels of Analysis," *Social Issues and Policy Review* 3, no. 1 (2009): 1-44, available at: doi: 10.1111/j.1751-2409.2009.01009.x; McCauley and Moskalenko, "Individual and Group Mechanisms of Radicalization"; Randy Borum, "Radicalization into Violent Extremism I: A Review of Social Science Theories," *Journal of Strategic Security* 4 (2011): 7-36, available at: *http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1139&context=jss*; James Spitaletta, *Countering Terrorism, Strategic Multi-Layer Assessment* (Wright-Patterson AFB, USA: Multi-Agency and Air Force Research Laboratory, 2013).
[30] Ajzen, "The Theory of Planned Behavior," 179-211.

Indicators were selected using a structured process. The initial set of indicators came from CB cases, relevant social science literature, and literature on terrorism and violent extremism.[31] The strength of support for each indicator, its connection to violence or CB violence, and its similarity to other indicators determined the indicator's retention or deletion.
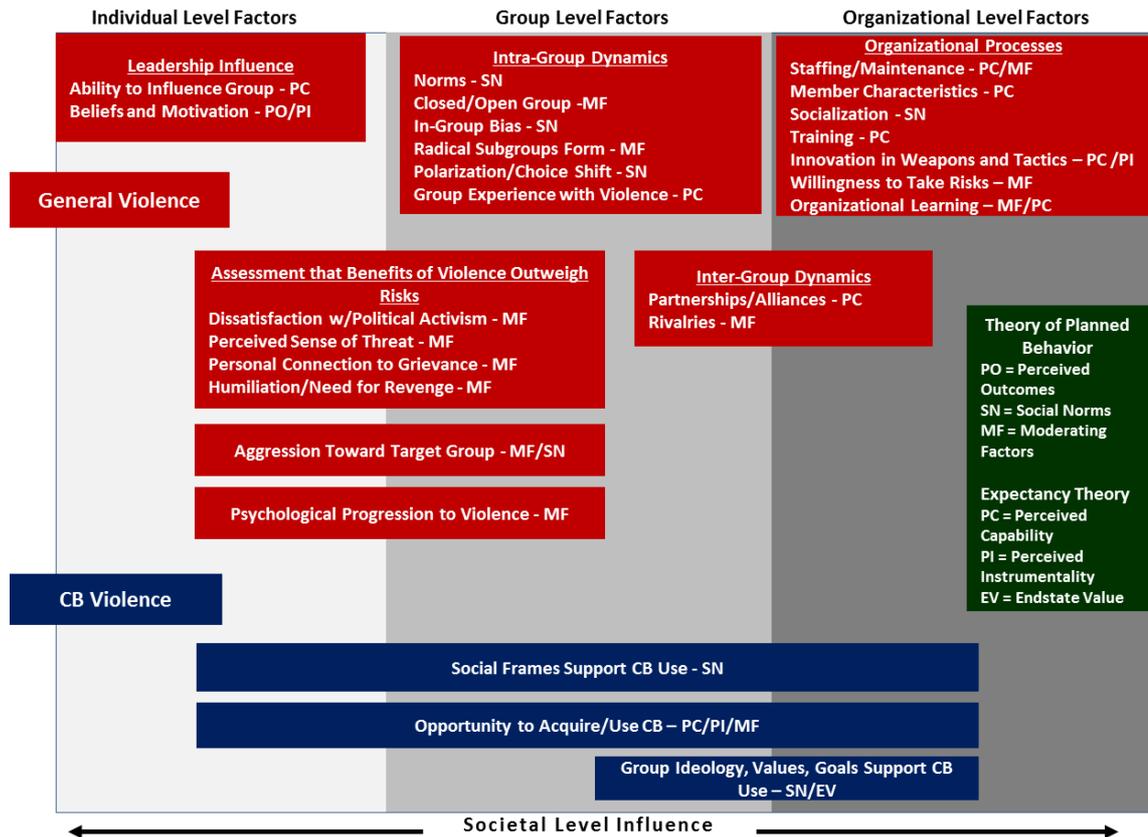

Figure 1: Composite and individual indicators and their relationship to components of the theory of planned behavior and expectancy theory[32]

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[31] Carus, "Bioterrorism and Biocrimes"; Jonathan B. Tucker, "Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons." (Cambridge, MA: MIT Press, 2000); Margaret G. Hermann, "Assessing leadership style: A trait analysis," in *The Psychological Assessment of Political Leaders*, ed. by Jerrold M Post (Ann Arbor: The University of Michigan Press, 2002) 178-212, available at: *https://s3.amazonaws.com/academia.edu.documents/45062814/_Jerrold_M._Post__The_Psychological_Assessment_of_Political_Leaders_1.pdf?AWSAccessKeyId=AKIAIWOWYYGZ2Y53UL3A&Expires=1505284601&Signature=bKr6NAf390K%2Bob29tfbPJ6DlSL8%3D&response-content-disposition=inline%3B%20filename%3DTHE_PSYCHOLOGICAL_ASSESSMENT_OF_POLITICA.pdf*; Edwin A. Locke and Gary P. Latham, "New directions in goal-setting theory," *Current Directions in Psychological Science* 15 (15): 265-68, 2006; McCormick, "Terrorist Decision Making"; Clark McCauley and Sophia Moskalenko. *Friction: How Radicalization Happens to Them and Us* (New York: Oxford University Press, 2011); Sageman, "Small Group Dynamics," 128-37; Ehud Sprinzak, "From Theory to Practice: Developing Early Warning Indicators for Terrorism" (Washington, D.C.: US Institute of Peace, 1998).

[32] Figure created by the authors.

General Violence consists of five composite indicators (Leadership Influence, Risk/Benefit Assessment of Violence, Intra-Group Dynamics, Inter-Group Dynamics, and Organizational Processes) and two individual indicators (Aggression Toward the Target Group and Psychological Progression toward Violence).

The three individual indicators indicative of a Tendency toward Violence using CBW are Social Frames Support Use of CB Weapons, Opportunity to Acquire or Use CB Weapons, and Ideology, Values and Goals Support Use of CB Weapons. Although each of these three indicators could be associated with conventional and other unconventional weapons, only CBW-specific instantiations constitute relevant signals of an interest in CBW.

The following section describes the indicators associated with general violence and CB violence and the behavioral, organizational, and political constructs supporting each factor. Examples illustrate how the constructs have been observed in or discussed regarding specific, violent groups. A small number of examples are about violent criminal organizations. There are commonalties across violent groups, whether terrorists, gangs, or criminal groups and more is known about the intra-group dynamics of gangs and criminal groups than of terrorist groups. Recognized differences include the importance of ideology and political objectives to terrorist groups and the financial motives attributed to most gangs and criminal groups.[33]

General Violence

Groups that have decided to use CBW have already opted for violence as a means to achieve their goals. Hence, the indicators associated with a tendency to engage in violence are necessary, but not sufficient, preconditions for CB violence. It is important to acknowledge that prior acts of violence may not precede the use of CBW and the decision to use violence may occur close in time with the choice of method, especially if serendipity favors a particular method. However, for large-scale attacks, complex operations, or difficult to acquire weapons or technologies, some amount of planning, procuring, and testing prior to an attack would improve the likelihood of success. These pre-attack activities may produce observable signatures of intended violence and the type of violence likely to occur. The composite indicators related to general violence have been associated with group and organizational characteristics, processes, and functioning in general, and with the operations of terrorist, criminal, or

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[33] Scott Decker and David Pyrooz, "Gangs, Terrorism, and Radicalization," Journal of Strategic Security 4, no. 4 (2011): 151, available at: *http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1145&context=jss*.

political groups that have attempted to achieve their goals through violence.

Leadership Influence: Leadership Influences Group toward Use of Violence

This composite indicator reflects the intentional efforts by influential group members to move the group toward violence. Leader characteristics, goals, beliefs, and group interactions collectively reflect leadership influence on a group. A change in leadership or leadership style may signal a change in the group's direction or activities (for example, toward greater violence). While it may not be possible to assess leadership influence in emerging groups for which little information exists, the model provides a framework for data collection.

Leader's Ability to Impact or Influence Group Members

Attributes that comprise a leader's cognitive abilities, personality, motives and values, problem-solving and social skills, and expertise can provide insights into a leader's potential influence on a group. Groups led by authoritarian or totalitarian leaders are more vulnerable to radical action and violence through polarization and groupthink.[34] Among larger terrorist groups (for example, al Qaeda, Hamas, Hezbollah, Liberation Tigers of Tamil Eelam [LTTE]), strategic decisions are typically made by top leaders and core members while operational decisions are generally made by the leadership of the group's individual cells.[35] Strong, assertive, self-confident, and driven leaders who have the trust of the group can wield considerable influence over the group and its goals.[36]

> EXAMPLES: Shoko Asahara, the leader of the Aum Shinrikyo group that perpetrated the 1995 sarin attack in the Tokyo subway, was described as having a monopoly on decision making within the group.[37]
>
> Leadership within the Covenant, the Sword, and the Arm of the Lord restricted participation in decision making to core members.[38]

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[34] Post, Ruby, and Shaw, "The Radical Group in Context."

[35] Mayntz, "Organizational Forms of Terrorism: Hierarchy, Network, or a Type Sui Generis?"

[36] Hermann, "Assessing leadership style,"178-212; David C. McClelland and David H. Burnham, "Power Is the Great Motivator," *Harvard Business Review* 54, no. 2 (1976): 100-10, available at: https://hbr.org/2003/01/power-is-the-great-motivator; Gary A. Yukl, *Leadership in Organizations* (Englewood Cliffs, NJ: Prentice Hall, 1989), available at: http://corenet.org.pk/js/Gary-Yukl-Leadership-in-Organizations.pdf.

[37] Nehorayoff, Ash, and Smith, "Aum Shinrikyo's Nuclear and Chemical Weapons Development Efforts," 35-48; Kaplan, "Aum Shinrikyo (1995)."

[38] Stern, "The Covenant, the Sword, and the Arm of the Lord (1985)."

Leadership Beliefs and Motivations

Over time, the beliefs and goals of influential members will help define the group's values and beliefs and provide focus and direction to its activities.[39] For political, insurgent, criminal, or terrorist groups, this may include influence on decisions about the use of violence and the weapons and tactics to employ. Research suggests that the decision to pursue unconventional weapons requires patient leadership, willingness to accept risk and failures, and a willingness to absorb the associated costs.

> EXAMPLE: Osama bin Laden was described as the North Star of global terrorism influencing both the terrorist organization he founded and its affiliated groups. His anti-Western Wahhabist ideology shaped al Qaeda's strategy to expel US forces from the Arabian Peninsula.[40]

Risk/Benefit Assessment of Violence

The belief that the benefits of terrorism outweigh the risks may result from the perceived instrumentality of terrorism to achieve group ends compared with the instrumentality of other approaches or because of unmet psychological needs of group members.[41] Indicators in this composite have been identified as key factors in radicalization toward violence. They are also interrelated such that the same antecedent factor may be present for multiple indicators.

Dissatisfaction with the Status Quo of Political Activism

This indicator represents the negative affect associated with the perceived ineffectiveness of existing means of political activism. Violent conflict may arise if one or more competing groups perceive they can change the status quo by fighting or do not believe non-violent means will achieve goals.[42]

> EXAMPLE: The belief that the US government infringes on the fundamental rights of citizens and supports the creation of a world government influenced the ideology and violent activities of the

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[39] Locke and Latham, "New Directions in Goal-Setting Theory," 265-8.
[40] Kate Zernike and Michael T. Kaufman, 'The Most Wanted Face of Terrorism," *New York Times*, May 2, 2011, available at:
http://www.nytimes.com/2011/05/02/world/02osama-bin-laden-obituary.html, accessed February 2, 2017.
[41] McCormick, "Terrorist Decision Making,"473-507; Vroom, *Work and Motivation*.
[42] David E. Cunningham, "Who Gets What in Peace Agreements?" in *The Slippery Slope to Genocide: Reducing Identity Conflicts and Preventing Mass Murder*, ed. Mark Ansley, I. William Zartman, and Paul Meerts (New York, NY: Oxford University Press, 2011).

Covenant, the Sword, and the Arm of the Lord.[43]

Perceived Sense of Threat

Groups may behave aggressively when they perceive threat from another group, seek vengeance for harm caused by another group, or are in competition with another group for resources that would ensure their survival.[44] Groups that perceive a high level of threat "are more likely to pursue high-risk strategies."[45]

> EXAMPLES: The Turkish government suspended 11,285 teachers in September 2016 over suspected links to the Kurdistan Workers' Party (PKK) which the government regards as a terrorist organization.[46]
>
> The Turkish government shutdown 15 media outlets and arrested the editor-in-chief and other executives of a secular newspaper who were accused of committing crimes in support of Kurdish militants.[47]
>
> Amnesty international called civilian casualties and widespread use of 24-hour curfews in Kurdish areas that sometimes lasted for weeks "collective punishment" of Kurds living in Turkey.[48]

Personal Connection to Grievances

Personal grievances or close connections to one's in-group, which has grievances against another group (an out-group), have been identified as factors in radicalization.[49] In several confirmed cases of biological agent use since 1900, the perpetrators were individuals seeking retribution or

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[43] Stern, "The Covenant, the Sword, and the Arm of the Lord (1985)."

[44] Tucker, "Lessons from the Case Studies," 260.

[45] Post, Ruby, and Shaw, "The Radical Group in Context."

[46] Al-Jazeera, "Turkey suspends 11,000 teachers for suspected PKK links," 2016, available at: http://www.aljazeera.com/ (Aljazeera English: Doha, Qatar).

[47] Constance Letsch, "Turkey shuts 15 media outlets and arrests opposition editor." *The Guardian* (October 31, 2016), available at: *https://www.theguardian.com/world/2016/oct/30/turkey-shuts-media-outlets-terrorist-links-civil-servants-press-freedom*, accessed April 26, 2017.

[48] Dorian Jones, "Amnesty International Condemns Turkey's Treatment of Kurds." *Voice of America News* (January 21, 2016), available at: *http://www.voanews.com/a/amnesty-calls-turkeys-campaign-against-kurds-collective-punishment/3155683.html,* accessed March 28, 2017; Ceylan Yeginsu, "Turkey's campaign Against Kurdish Militants Takes Toll on Civilians." *New York Times* (December 30, 2015), available at: *https://www.nytimes.com/2015/12/31/world/europe/turkey-kurds-pkk.html?_r=0*, accessed March 28, 2017.

[49] McCauley and Moskalenko, *Friction: How Radicalization Happens to Them and Us.*

punishment for others who they believed had wronged them.[50] Grievances or feelings of exclusion, from opportunities can also be important recruitment motivators for armed groups.[51]

> EXAMPLES: A survey of Amsterdam Muslims found that some Muslim youth radicalized because of strong feelings that Muslims were victims of discrimination.[52]

> Holocaust survivors within Avenging Israel's Blood (DIN) poisoned the bread of Nazi prisoners of war to avenge the deaths of millions of Jews.[53]

Humiliation and Need for Revenge

Humiliation of a group can contribute to perceived social disparity, a need for revenge, and potential extremist behavior.[54] Kruglanski and his colleagues cite humiliation by one's enemy and the desire to reciprocate the harm caused to oneself or one's group as motivating forces in radicalization.[55]

> EXAMPLE: A history of persecution of the Basques by Francisco Franco led to the creation of the radical Basque organization Euskadi Ta Askatasuna (ETA) dedicated to armed actions against the Spanish government.[56]

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[50] Carus, "Bioterrorism and Biocrimes."

[51] Alpaslan Özerdem and Sukanya Podder, "Disarming Youth Combatants: Mitigating Youth Radicalization and Violent Extremism," *Journal of Strategic Security* 4, no. 4 (2011): 63, available at:
http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1141&context=jss.

[52] Marieke Slootman and Jean Tillie, in *Processes of Radicalisation. Why Some Amsterdam Muslims Become Radicals*, eds. I. Weijers and C. Eliarts (University of Amsterdam, 2006), available at: https://ecpr.eu/Filestore/PaperProposal/75a50bb9-0e77-4bda-9b77-a240fda72cc8.pdf.

[53] Ehud Sprinzak and Idith Zertal, "Avenging Israel's Blood (1946)," in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan B. Tucker (Cambridge, MA: MIT Press, 2000).

[54] Sprinzak, "From Theory to Practice"; Post, Ruby, and Shaw, "The Radical Group in Context"; Sprinzak and Zertal, "Avenging Israel's Blood (1946)."

[55] Arie W. Kruglanski, Michele J. Gelfand, Jocelyn J. Belanger, Anna Sheveland, Malkanthi Hetiarachchi, and Rohan Gunaratna, 'The Psychology of Radicalization and Deradicalization: How Significance Quest Impacts Violent Extremism," *Advances in Political Psychology* 35 Suppl 1 (2014): 69-93, available at:
http://onlinelibrary.wiley.com/doi/10.1111/pops.12163/abstract.

[56] Isambard Wilkinson, "Basque Terrorists Driven by Their Hatred of Franco," *The Telegraph* March 23, 2006, available at:
http://www.telegraph.co.uk/news/worldnews/europe/spain/1513769/Basque-terrorists-driven-by-their-hatred-of-Franco.html.

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Aggression toward the Target Group

Groups may behave aggressively when they perceive another group threatens them. Perceptions of extreme threats and aggression from hostile others may provoke extreme violence in response.[57] The intensity and basis of negative emotions that drive behavior directed toward others will influence a group's predisposition toward violence against them.[58]

> EXAMPLE: The Christian Identity movement, whose ideology has been associated with justification for hate crimes, refers to Jews as "children of Satan" and blacks as "mud people."[59]

Psychological Progression toward Violence

Violence is typically not the primary objective of most political, religious, ethnic, or ideological groups. Rather, a group's acceptance of violence to achieve goals may develop over time and after unsuccessful attempts using non-violent means. Once people believe violence is an acceptable action, the form that violence takes becomes a matter of choice, resources, capabilities, and opportunity, among other factors.

> EXAMPLES: In 1960, the Student Non-Violent Coordinating Committee [later named Student National Coordinating Committee (SNCC)] staged non-violent student sit-ins as part of the southern civil rights movement. By 1963, SNCC criticized the lack of progress in civil rights for blacks and demanded immediate reforms. By 1966, group leadership called for confrontation with whites.[60]

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57 Kruglanski, Gelfand, Belanger, Sheveland, Hetiarachchi, and Gunaratna, "The Psychology of Radicalization and Deradicalization"; Tucker, "Lessons from the Case Studies," 260.

58 Silvan S. Tomkins, "Affect, Imagery, and Consciousness," in *The Positive Effects,* vol. 1 (New York, NY: Springer, 1962), available at: *http://testrain.info/download/Silvan%20S.%20Tomkins%20PhD%20Affect%20Im agery%20Consciousness%20The%20Complete%20Edition%20v.%201%20- %20v.4%202008.pdf;* David Matsumoto, "The Role of Emotion in Escalating Violent Non-State Actors to Hostility," in Protecting the Homeland from International and Domestic Terrorism Threats: Current Multi-Disciplinary Perspectives on Root Causes, the Role of Ideology, and Programs for Counter-Radicalization and Disengagement, eds. Laurie Fenstermacher et al. (Wright-Patterson AFB, USA: Multi-Agency and Air Force Research Laboratory, 2010).

59 Anti-Defamation League, "Christian Identity," in *Extremism in America*, no date. *http://archive.adl.org/learn/ext_us/christian_identity.html*, accessed March 2016; Stern, "The Covenant, the Sword, and the Arm of the Lord (1985)"; Tucker, "Lessons from the Case Studies," 260.

60 Stanford University, "Student Nonviolent Coordinating Committee (SNCC)," in *King Encyclopedia,* available at: http://kingencyclopedia.stanford.edu/encyclopedia/encyclopedia/enc_student_nonv iolent_coordinating_committee_sncc/, accessed July 2015.

In its early years, Boko Haram created religious schools to propagate the teachings of the Prophet Muhammad and establish an Islamic state in Nigeria. Some sources attribute its radicalization and militancy as a response to the government's harsh suppression of protests and escalating clashes between the police and army and Boko Haram.[61]

Intra-Group Dynamics

Intra-group dynamics refers to the behavior and formal and informal processes within a group that influence its structure and functioning. It represents the patterns of stability and change that affect the group's ability to survive and operate effectively. Important processes resulting from intra-group dynamics include the norms that influence member behavior, group cohesiveness, decision making, and group direction usually in the form of group leadership.[62] Intra-group dynamics that support violence are observed in ongoing behavior and activities (for example, whom a group recruits and training provided members) or a change in behavior and activity such as increasingly violent rhetoric or tactics.

Group Norms Support Violence

All groups require mechanisms such as structure and assigned or assumed roles to guide or control member behavior, maintain order, and protect group integrity and survival. Groups create and enforce norms for behaviors that are important to the group and to maintain internal cohesion and the group's relationships with other entities.[63] Norms also help define expected and acceptable behaviors of group members. Cultural and religious norms in particular can facilitate effective group functioning as they define and reinforce acceptable behaviors for group members and express to others what the group believes.[64]

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[61] Mohammed Aly Sergie and Toni Johnson, "Boko Haram," *Council on Foreign Relations* 7, no. 10 (2014): 2014, available at: *http://www.cfr.org/nigeria/boko-haram/p25739*.

[62] Holly Arrow, Joseph E. McGrath, and Jennifer L. Berdahl, "Small Groups as Complex Systems: Formation, Coordination, Development, and Adaptation" (Thousand Oaks, CA: Sage Publications, 2000); Kurt Lewin, "Field Theory in Social Science: Selected Theoretical Papers" (London, UK: Tavistock Publications, 1952); Irving L. Janis, *Groupthink* 2nd ed. (Boston, MA: Houghton Mifflin, 1972).

[63] Marvin E. Shaw, *Group Dynamics: The Psychology of Small Group Behavior* 3rd ed. (New York, NY: McGraw, 1981); Feldman, "The Development and Enforcement of Group Norms."

[64] Feldman, "The Development and Enforcement of Group Norms."

> EXAMPLE: Justification provided by groups such as ISIS for their violent actions supports both personal and social acceptance of violence as rightful.[65]

In-Group Bias

In-group bias may result when a group's ideology shapes perceptions of others as similar to the group (us or in-group) or dissimilar (them or out-group) and helps establish and maintain positive self-image and identity. It is evident when one's group takes precedence over others and makes decisions favor of one's in-group.[66] In-group bias may support justification for violence against others (for example, enemies seen as the cause of problems).[67]

> EXAMPLE: British Muslims recruited by ISIS to fight in Syria believe they will be treated as equals, but often find they and other foreign fighters are disproportionately used as suicide bombers.[68]

Closed versus Open Group

When applied to social groups, the words open and closed refer to the permeability of group boundaries and consequent interactions with non-group members. Open groups have permeable boundaries and few constraints on interactions with outsiders. Closed groups have generally impermeable boundaries and little interaction with outsiders, and are susceptible to groupthink.[69] Relatively open groups that become highly restrictive about group membership and outside interactions may signal increased concern with secrecy concerning group operations. Physical or social isolation that insulates a group from societal norms and from notice by authorities can lead to reduced concerns about retribution or alienating supporters.[70]

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[65] Emin Dashkin, "Justification of violence by terrorist organizations: Comparing ISIS and PKK," *Journal of Intelligence and Terrorism Studies* 1 (2016), available at: https://doi.org/10.22261/PLV6PE (*http://www.veruscript.com/a/PLV6PE/).*

[66] Hermann, "Assessing Leadership Style"; Syracuse, NY: Social Science Automation, Inc. (1999); Ackerman, Asal, and Rethemeyer, "Toxic Connections."

[67] Victor Asal and R. Karl Rethemeyer, "The Nature of the Beast: Organizational Structures and the Lethality of Terrorist Attacks," *The Journal of Politics* 70, no. 02 (2008): 437-49.

[68] Robert Verkaik and John Hall, "Is ISIS running out of suicide bombers? Terror group suffers shortage of martyrs after dozens of fighters desert or defect to rival militias," *The Daily Mail*, (February 9, 2015), available at: *http://www.dailymail.co.uk/news/article-2945724/ISIS-experiencing-shortage-suicide-bombers-dozens-fighters-desert-terror-group-defect-rival-militias.html*.

[69] Gordon Marshall, "Closed Groups and Open Groups," in *A Dictionary of Sociology* (Encyclopedia.com, 1988), available at: *http://www.encyclopedia.com/doc/1O88-closedgroupsandopengroups.html*; Ibid; Janis, *Groupthink* 2nd ed.

[70] Tucker, "Lessons from the Case Studies."

EXAMPLE: The Rajneeshees, a religious cult that poisoned citizens in a small Oregon county to influence local elections, controlled member interactions with outside others and exercised strict control over access to their ranch.[71]

Radical Subgroups Form within a Larger Group

Similar characteristics, common interests or backgrounds, and shared goals or beliefs are often the basis for subgroup formation. Group leaders may create subgroups to perform activities that would otherwise put the entire group at risk (for example, a militant subgroup may be responsible for handling threats to the larger group) or perform functions that require specialized capabilities or expertise such as *skunkworks* to test weapons technologies or a research and development (R&D) function to develop new weapons or tactics. Regardless of how they form, subgroups can create fault lines and lead to splintering from the larger group.[72]

EXAMPLES: Hamas and the Palestinian Islamic Jihad were militant splinter groups from the Muslim Brotherhood.[73]

The Communist Party of India-Maoist emerged from the splintering of several factions of the Leftist movement in India to become one of the country's strongest insurgent groups.[74]

The Provisional Irish Republican Army (PIRA) created and maintained its "Engineering Department" for weapons R&D.[75]

Polarization and Choice Shift

Pressure toward uniformity in highly cohesive groups may lead to oversimplification of the decision-making process, intolerance of dissent, and increased vulnerability to polarization. Group polarization can

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[71] Carus, "The Rajneeshees."

[72] Katerina Bezrukova, "Understanding and Addressing Faultlines" (Paper presented at the Presented at Workshop on Science Team Dynamics and Effectiveness, The National Research Council, Washington, D.C., July 1, 2013), available at: http://sites.nationalacademies.org/cs/groups/dbassesite/documents/webpage/dbasse_083763.pdf; McCauley and Moskalenko, "Individual and Group Mechanisms of Radicalization."

[73] US Department of State, "Terrorist Groups," in *Terrorist Groups*, (Washington, D.C.: US Department of State, no date), available at: *https://www.state.gov/documents/organization/45323.pdf*.

[74] Akanksha Mehta, "Surge in the Red Tide: India's Maoist Insurgency," Counter Terrorist Trends and Analysis, *Journal of the International Centre for Political Violence and Terrorism Research* 2 (2010): 1-4.

[75] Gary A. Ackerman, "The Provisional Irish Republican Army and the Development of Mortars," *Journal of Strategic Security* 9, no. 1 (2016): 12-34, available at: http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1501&context=jss.

contribute to "extremism, 'radicalization,' [and] cultural shifts."[76] Polarization may occur under several conditions: authoritarian leadership, high group cohesion, suspicion of outsiders and outside ideas, time pressures to decide on a course of action, few checks on internal power, hierarchical decision-making structure, a culture and norms supporting consensus and discouraging divergent opinions, and support from constituents for more radical activity or positions.[77]

A choice shift is evident when the final opinion or position of the group is different––more positive or negative—from members' initial positions (for example, a historically non-violent group promotes violent means to achieve objectives).[78] Polarization occurs when the shift is in the same direction as members' initial positions—initial positive (or negative) positions are more positive (or negative).[79] Polarization would be evident when a group tending toward violence becomes supportive and accepting of violence. Both types of shifts could signal a progression toward violence.

Deliberations of groups that progress toward violence are difficult to observe. Consequently, it is difficult to track changes from initial stating opinions or positions. However, several of the groups cited throughout this document appear to have operated under conditions conducive to polarization and choice shift.

> EXAMPLE: Decision making in Aum Shinrikyo and the Rajneeshees was completely under the control of the group's authoritarian leaders' hierarchical decision-making structure. Both were closed groups that restricted or controlled contact with outsiders, members were generally confined within the group's compound, and leaders experienced time pressures to achieve objectives.

Group Experience with Violence

A "group's collective experience with violence" may emerge from prior involvement of group leaders and members in violent activities and

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[76] Cass R. Sunstein, "The Law of Group Polarization," in *John M. Olin Law & Economics Working Paper No. 91 (2nd Series)* (Chicago, IL: The Law School of The University of Chicago, 1999), 1; McCauley and Moskalenko, "Individual and Group Mechanisms of Radicalization".

[77] Post, "Group and Organizational Dynamics of International Terrorism"; Jerrold M Post, "Differentiating the Threat of Chemical and Biological Terrorism: Motivations and Constraints," *Peace and Conflict: Journal of Peace Psychology* 8, no. 3 (2002): 187, available at: http://dx.doi.org/10.1207/S15327949PAC0803_02.

[78] Noah E. Friedkin, "Choice Shift and Group Polarization," *American Sociological Review* (1999): 856-75.

[79] Andrew K. Semmel and Dean A. Minix, "Small-Group Dynamics and Foreign Policy Decision-Making," in *Psychological Models in International Politics*, ed. Lawrence S. Falkowski (Boulder, CO: Westview Press, 1979).

recruitment of individuals experienced in violence.[80] Violent behavior may become the dominant response to a situation if the violence consistently leads to desired outcomes.[81]

> EXAMPLE: The Real IRA (Irish Republican Army) actively recruited disaffected members from the original IRA who rejected the Good Friday accords and the peace process.[82]

Inter-Group Dynamics

Underlying all organizational networks are ties that connect network members. These may be formal, instrumental ties for mutual benefit such as leveraging resources or capabilities or informal ties based on shared beliefs, values, interests, or personal relationships. Network connections enable information sharing that would otherwise be difficult to obtain, including innovations in weapons, technology, and tactics.[83]

Criminal organizations have historically relied on networks such as family and tribal or community relationships to facilitate their illicit activities. Criminal groups also develop relationships and marry strategically to gain entry into advantageous groups, networks, and locations to which they might otherwise not have access.[84] Terrorist and violent extremist organizations rely on networks to facilitate their missions.[85]

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[80] Post, Ruby, and Shaw, "The Radical Group in Context."

[81] Burrhus Frederic Skinner, *Science and Human Behavior* (Simon and Schuster, 1953);
JER Staddon and D.T. Cerutti, "Operant Conditioning," *Annual Review of Psychology* 54 (2003): 115.

[82] Ackerman, "The Provisional Irish Republican Army and the Development of Mortars," 12-34.

[83] John Arquilla and David Ronfeldt, *Networks and Netwar: The Future of Terror, Crime, and Militancy* (Santa Monica, CA: RAND Corporation, 2001), available at: https://www.rand.org/pubs/monograph_reports/MR1382.html.

[84] Mary D Zalesny, "Networking and the Legitimization of Transnational Crime Organizations," in The "New" Face of Transnational Crime Organizations (TCOs): A Geopolitical Perspective and Implications for US National Security, Strategic Multi-Layer Assessment Occasional Paper (2013); Ed Reina, Vince Garcia, and Isodro Lopez, Personal Communication April 28, 2010. Source: Ed Reina (Director of Public Safety; Joseph Delgado, Chief of Police, Tohono O'odham Nation Tribal Police), Vince Garcia (Tohono O'odham Nation Tribal Police), Isodro Lopez (Vice Chairman, Tohono O'odham Nation); Andrew Thomas, Tina Sunday, and Dennis O'Neal, Personal Communication December 15, 2009. Source: Andrew Thomas (Chief of Police, St. Regis Mohawk Tribal Police), Tina Sunday (Lieutenant and Intelligence Officer, St. Regis Mohawk Tribal Police), Dennis O'Neal (US Border Patrol, Massena NY Station, previously on SW US border).

[85] Tricia Bacon, Alliance Hubs: Focal Points in the International Terrorist Landscape, 8 (2014): 4-26, available at: https://www.gpo.gov/fdsys/pkg/USCODE-2011-title18/pdf/USCODE-2011-title18-partI-chap113B-sec2332a.pdf.

Alliances/Partnerships

Alliances or partnerships can vary in duration (from short-term tactical or transactional alliances to long-term mergers or strategic alliances), extent of alliance member interdependence, range and variety of activities, ideological similarity, and expected level of trust between members. *Bay'ah,* or pledge of allegiance to a group's leader by another group, is an example of a high-level connection that may lead to a formal merger.[86] Lower level relationships include instrumental tactical and transactional alliances, which tend to maintain each group's independence, involve limited activities, and not require a shared ideology or high level of trust.[87]

Most alliances or partnerships are intentional–or at least convenient–as when groups establish a network to leverage resources or share information.[88] Alliance hubs, which are closely-knit clusters of cooperating organizations, are vehicles for organizational learning and dissemination of innovations among the hub members.[89] For example, dissemination of knowledge can occur through *demonstration effects* by a network member currently using new weapons technology.[90] Weaker alliance partners may adopt the stronger partner's tactics to improve their effectiveness and range. They may also assume a specialized role that benefits all alliance members (for example, establishing an R&D program or experimenting with new tactics and weapons such as CBW).

> EXAMPLE: When the Salafist Group for Preaching and Combat allied with al Qaeda in 2006 (becoming al Qaeda in the Islamic Maghreb or AQIM), it adopted al Qaeda's tactic of suicide operations and focused on the high profile targets al Qaeda attacked.[91]

Rivalries

Rivalries may emerge because of conflicting beliefs, values, or tactics, or competition for influence over a population or area (for example, competition among the mujahidin groups in post-Soviet occupation

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[86] Jacob Zenn, "A Biography of Boko Haram and the *Bay'a* to Al-Baghdadi," *CTC Sentinel* 8 (2015): 17-21, available at: https://ctc.usma.edu/posts/a-biography-of-boko-haram-and-the-baya-to-al-baghdadi.

[87] Defense Intelligence Agency, Human Factors Analysis Center. "Dynamic Group Assessment Methodology." July 2009.

[88] Post, "Group and Organizational Dynamics of International Terrorism"; Post, "Differentiating the Threat of Chemical and Biological Terrorism," 187.

[89] Nicholas Blanford, *Warriors of God: Inside Hezbollah's Thirty-Year Struggle against Israel* (New York, NY: Random House, 2011).

[90] Letsch, "Turkey shuts 15 media outlets and arrests opposition editor."

[91] Post, "Group and Organizational Dynamics of International Terrorism."

Afghanistan).[92] They may also contribute to radicalization of each groups' members.[93] Previously non-violent groups may engage in violence and violent groups may explore new tactics or weapons to stand out from their rivals.

> EXAMPLE: ISIS propaganda has described rival Islamist groups or anti-ISIS groups such as Ahrar al-Sham and the al Qaida/Nusra Front as apostates and traitors linked to Iraqi Sunni tribal opposition to the Islamic State in Iraq.[94]

Organizational Processes

Violent groups and terrorist groups must perform tasks necessary for group maintenance, support, survival, and growth.[95] In addition to attracting and recruiting members, groups must also socialize, train, and retain members, and organize to accomplish its objectives.[96] For example, ISIS has specialized functions to oversee finance, security, media, and recruitment operations.[97]

Staffing and Maintaining the Organization

In addition to recruiting, groups must retain current members who contribute operational expertise, training, capabilities, and understanding of norms and standard operating procedures. A shift in a group's recruitment, training, socialization, and operational tactics may indicate new objectives and an increased risk of violence if the change is consistent with support for violent activities.[98] The rise in status of group members involved in violent attacks may communicate within and outside the group that violence is acceptable and is a means to advancement in leadership ranks.

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[92] Sprinzak, "From Theory to Practice"; Post, "Group and Organizational Dynamics of International Terrorism."

[93] McCauley and Moskalenko, "Mechanisms of Political Radicalization," 415-33.

[94] Alberto M. Fernandez, "Here to stay and growing: Combating ISIS propaganda networks," The Brookings Project on United States Relations with the Islamic World, United States-Islamic World Forum Papers (Brookings Institution, Washington, D.C) October 2015, https://www.brookings.edu/research/here-to-stay-and-growing-combating-isis-propaganda-networks/.

[95] Jeyong Jung and Julak Lee, "Organizational Behavior of Terrorist Groups," *Journal of Public Administration and Governance* 5, no. 2 (2015): 62-77, available at: https://doi.org/10.5296/jpag.v5i2.7551.

[96] Marshall, "Closed Groups and Open Groups."

[97] Gregor Aisch, Joe Burgess, C. J. Chivers, Alicia Parlapiano, Sergio Peçanha, Archie Tse, Derek Watkins, and Karen Yourish. "How ISIS Works." *New York Times,* September 16, 2014. *https://www.nytimes.com/interactive/2014/09/16/world/middleeast/how-isis-works.html*; Armin Rosen, "ISIS is Running an Alarmingly Effective Terrorist State." available at: *http://www.businessinsider.com/how-the-isis-caliphate-operates-2014-12*.

[98] Ibid, 90.

EXAMPLE: Aum Shinrikyo recruited PhD-level microbiologists and chemists before the group moved toward chemical/biological terrorism.[99]

Member Characteristics

To achieve its objectives, a group must recruit individuals with capabilities commensurate with task requirements or train them. For groups with an interest in or intention to use violence or CBW, attractive recruits will have experience with violence and capabilities and experience related to the weapons and tactics the group wishes to employ (for example, expertise in explosives, chemistry, biology/microbiology, chemical engineering, information technology). Groups may present themselves as legitimate support organizations to build connections with individuals who are vulnerable (for example, because of characteristics or circumstance) and more likely to succumb to persuasion.[100] Vulnerable individuals may also seek out groups for the opportunity to affiliate with peers or individuals with whom they self-identify.[101]

EXAMPLES: Islamic State of Iraq and al-Sham's recruiting strategy targets characteristics specific to its operational needs. For suicide bombing, it targets the homeless, disabled, young, and frustrated refugees.[102] For less expendable and necessary positions, it recruits professionals and university students such as journalists for propaganda work and engineers to run captured industries.[103]

Richard Reid, recruited by al Qaeda to bring down a US airline flight using explosives hidden in his shoes, was described as impressionable by the imam at the mosque Reid attended in the UK.[104]

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[99] Kaplan, "Aum Shinrikyo (1995)."

[100] Frank J. Cilluffo, Sharon L. Cardash, and Andrew J. Whitehead, "Radicalization: Behind Bars and Beyond Borders," *The Brown Journal of World Affairs* 13 (2006): 113, available at: https://cchs.gwu.edu/sites/cchs.gwu.edu/files/downloads/HSPI_Journal_11.pdf.

[101] Henri Tajfel and John C. Turner, "The Social Identity Theory of Intergroup Behavior," in *Psychology of Intergroup Relations*, eds. Stephen Worchel and William G. Austin (Chicago, IL: Nelson-Hall Publishers, 1986).

[102] Matthew Schofield, "Islamic State's Next Recruiting Target: Germany's Young and Vulnerable," *Stars and Stripes* (2015).

[103] Yusuf Huma, "University Radicalization: Pakistan's Next Counterterrorism Challenge," *CTC Sentinel* 9 (2016): 4-8; *CBS News*, "ISIS Courts White-Collar Recruits in Pakistan," in *ISIS Courts White-Collar Recruits in Pakistan*, (New York: CBS Corporation, March 2, 2016).

[104] Scott Gerwehr and Sara Daly, "Al-Qaida: Terrorist Selection and Recruitment," in *Al-Qaida and Global Jihad*, chap. 5 (Santa Monica, CA: RAND Corporation, 2006).

Socialization

Groups may socialize individuals to radical ideologies that facilitate recruitment through social interactions involving family, friends, and others important to the individual who support those ideologies.[105] Once joining a group, new members may undergo secondary socialization to familiarize them with the group's culture, functioning, and structure.[106]

> EXAMPLES: Almost one-quarter of the members of the Italian Red Brigades and one-third of the 9/11 hijackers were related.[107]

> Extreme approaches to socialization include the conscription of children to become child soldiers in South Sudan and the kidnapping and impregnation of women by the Shining Path to socialize future soldiers from birth.[108]

Training

Unless a group recruits experienced individuals, some training will be required to prepare new group members for various operations. A change in group strategy from non-violence to violence will require internal or external training in how to destroy property and facilities and how to injure and kill people.[109]

> EXAMPLE: Hezbollah is known for its sophisticated military training camps, which include firing ranges, assault courses, and urban warfare sites. The camps provide both basic and advanced skills training for recruits and existing members.[110]

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[105] Mohammed M. Hafez, "The Ties that Bind: How Terrorists Exploit Family Bonds," *CTC Sentinel* 9 (2016): 15-7, available at: https://ctc.usma.edu/posts/the-ties-that-bind-how-terrorists-exploit-family-bonds.

[106] Post, Ruby, and Shaw, "The Radical Group in Context," 91-92.

[107] Donatella Della Porta, "Left-Wing Terrorism in Italy," in *Terrorism in Context*, ed. Martha Crenshaw (University Park, PA: Pennsylvania State University Press, 1995).

[108] Tom Burridge, "Child Soldiers Still Being Recruited in South Sudan," in World |Africa (London: BBC News, October 27, 2014) available at: *http://www.bbc.com/news/world-africa-29762263*; Jenny Stanton, "Rescued after Decades in Captivity: Slaves Held in Shining Path 'Troop-Making Camps' in Peru Where Women Were Raped to Produce Future Soldiers Are Finally Freed" (London: *The Daily Mail*, July 29, 2015), available at: http://www.dailymail.co.uk/news/article-3178355/Rescued-decades-captivity-Slaves-held-Shining-Path-troop-making-camps-Peru-women-raped-produce-future-soldiers-finally-freed.html.

[109] Brian A. Jackson et al., "Aptitude for Destruction," in *Case Studies in Organizational Learning in Five Terrorist Groups,* vol. 2 (Santa Monica CA: RAND Corporation, 2005), available at: https://www.rand.org/pubs/monographs/MG332.readonline.html.

[110] Nicholas Blanford, *Warriors of God*; Nicholas Blanford, "Look Who's Training: Hezbollah Prepares for War," *Christian Science Monitor*, December 4, 2013, available at: https://www.csmonitor.com/World/Middle-East/2013/1204/Look-who-s-

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Innovation in Weapons and Tactics; Willingness to Take Risks

Group leadership is a key factor in a group's exploration and adoption of unconventional and innovative weapons and tactics.[111] Successful innovations benefit from leadership that is open to experience and information, and willing to take risks that may result in failures. Leader risk taking, however, may be constrained by compatibility of the weapons system with group ideology and values, the group's acceptance of the leader's decision, momentum toward adoption (including sunk costs), sufficient technical expertise to produce or operate new weapons or technologies, opportunity, and access to a safe haven in which to experiment with new weapons or tactics.[112]

> EXAMPLE: The Revolutionary Forces of Colombia (FARC) designed and built submersible and reusable narco submarines to overcome improved detection and interdiction of fast boats by authorities.[113]

Organizational Learning

Organizational knowledge resides in the rules, procedures, conventions, strategies, and technologies around which organizations are structured and how they operate.[114] It becomes part of collective memory.[115] Organizations acquire information through networks, alliances, or partnerships and *intelligent failures* that provide important diagnostic information.[116] Learning organizations are well-positioned to innovate.

Conditions that support intelligent failures and organizational learning include a focus on process, acceptance or legitimization of failure (such as leadership willing to learn from mistakes and not punish risk taking), publicizing or acknowledging intelligent failures, training for resilience,

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training-Hezbollah-prepares-for-war; Magnus Ranstorp, "The Hezbollah Training Camps of Lebanon," in *The Making of a Terrorist: Recruitment, Training, and Root Causes,* vol. 2, ed. James Forest (Westport, CT: Praeger Security International, 2006).
[111] Ackerman, *More Bang for the Buck.*
[112] Ackerman, *More Bang for the Buck*; Kruglanski, "The Psychology or Terrorism: 'Syndrome' Versus 'Tool' Perspectives"; Ackerman, "The Provisional Irish Republican Army and the Development of Mortars."
[113] Michelle Jacome Jaramillo, "The Revolutionary Forces of Colombia (FARC) and the Development of Narco-submarines," *Journal of Strategic Security* 9 no.1 (2016): 49-69, available at:
http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1509&context=jss.
[114] Barbara Levitt and James G. March, "Organizational Learning," *Annual Review of Sociology* (1988): 319-40, available at:
http://www.annualreviews.org/doi/pdf/10.1146/annurev.so.14.080188.001535.
[115] Bruce Hoffman, *Holy Terror: The Implications of Terrorism Motivated by a Religious Perspective* (Santa Monica, CA: RAND Corporation, 1993).
[116] Sim B. Sitkin, "Learning through Failure: The Strategy of Small Losses," in *Organizational Learning*, eds. Michael D. Cohen and Lee S. Sproull (Thousand Oaks, CA: Sage, 1995).

committing resources to efforts with uncertain outcomes, and incorporating problem solving into the organization's philosophy or ideology.[117]

> EXAMPLE: The Provisional Irish Republican Army has been described as having a "culture of learning," which included the pre-employment testing of weapons systems, willingness to innovate, and institutionalization of after-action analyses of successful and failed bombing attacks (for example, gathering post-attack information on unexploded ordnance through observers stationed at police barriers).[118]

CB Violence

Direct observation of group actions suggestive of interest or intent to use CBW may be difficult. However, other evidence indicative of intent may be available. Technical manuals related to chemical and biological agents, equipment to manufacture chemical or biological agents, or receipts for the purchase of agents or equipment found at a group's current or previous location all reflect at least an interest in chemical or biological agents. The arrest of a group member in possession of such materials, a group's association, partnership with suppliers or users of chemical- or biological-related materials, or third-party observations or statements would also constitute evidence of interest or intent. The CBW Intent Model proposes three indicators as indirect evidence of interest or intent to acquire or use CBW.

Social Frames Support the Use of CB Weapons

Framing refers to social influence on how individuals perceive or interpret and react to an object or event.[119] Perception of the same event can vary considerably depending on the frame in which the event is set. For example, a story about police arresting protesters framed by concerns for

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[117] Based on a recently compiled dataset of incidents of failed and foiled (outside intervention) jihadist attempts since 1993 to attack the United States and its Western allies, Crenshaw (2016) observed that terrorists may sometimes perceive a failed or foiled plot as being successful. Although data do not exist on whether failed or foiled attempts were treated by jihadist groups as intelligent failures and part of organizational learning, the compiled dataset may contain additional information on whether and which groups have other characteristics of a learning organization. Martha Crenshaw, "Failed, Foiled, Completed, and Successful Jihadist Plots in the United States 1993-2016," Telephonic presentation to the DHS/START/MINERVA and SMA Technical Lecture Series, Washington, D.C., May 31, 2016; Stephen Walsh and Paul Whitney, "A Graphical Approach to Diagnosing the Validity of the Conditional Independence Assumptions of a Bayesian Network Given Data," *Journal of Computational and Graphical Statistics* 21, no. 4 (2012): 961-78.
[118] Ibid, 90.
[119] Heidi A. Campbell and Diana Hawk, "Al Jazeera's Framing of Social Media During the Arab Spring," *CyberOrient, Journal of the Virtual Middle East* 6, no. 1 (2012).

the protest turning violent will be perceived differently (more favorably) than if the arrests are framed as an example of overly aggressive police tactics (less favorably).

Social framing by political, insurgent, and terrorist groups can help justify a group's ideology or behavior and suggest possible responses to an event.[120] Exposure to internal propaganda, communications from trusted others, social media, and the internet can tap deeply held beliefs, increase awareness of alternative weapons, tactics, and techniques, and communicate direct and subtle messages of acceptable or preferred weapons to use against enemies.[121] Groups may also stage unconventional activities (for example, ISIS videos of the beheading of hostages) or employ new technologies to increase media exposure, create propaganda for use in recruiting or training, or prompt others to emulate their actions. Social frames used by a group to radicalize others may influence lone wolf attackers who profess allegiance to a terrorist group.

Within social movements, activists use frames to present themselves and their ideas to gain the support of others.[122] Frames can convince others that their participation is necessary for change to occur.[123] They can also "highlight specific societal problems and identify the parties guilty of creating them."[124] Frames involving CBW can demonstrate how to initiate specific change that solves problems.

> EXAMPLE: Islamic imagery on websites has included
> combinations of weapons including gas masks to suggest the use or
> potential use of chemical or biological weapons to achieve
> objectives or in retaliation for use by the adversary (see Figure 2).[125]

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[120] Arquilla and Ronfeldt, *Networks and Netwar*.

[121] Combating Terrorism Center, *The Islamic Imagery Project: Visual Motifs in Jihadi Internet Propaganda* (West Point, NY: West Point Military Academy, 2006) p. 98.

[122] Pamela E. Oliver and Hank Johnston, *What a Good Idea: Frames and Ideology in Social Movement Research* (Unpublished, 2000). *http://www.ssc.wisc.edu/~oliver/PROTESTS/ArticleCopies/Frames.2.29.00.pdf*.

[123] William A. Gamson, *Talking Politics* (Cambridge, UK: Cambridge University Press, 1992).

[124] Maya Beasley, "Terrorism as Social Movement Tactic Theory," 146.

[125] Combating Terrorism Center, *The Islamic Imagery Project*, 98.

Figure 2: Social frames can suggest the use of CB weapons[126]

> EXAMPLE: ISIS uses at least two propaganda magazines to recruit jihadists especially from the West: Rumiyah and Dabiq. Of the two, Dabiq uses slick photos of heavily armed fighters and exaggerates claims about the group's terrorist attacks.[127]

Opportunity to Acquire or Use CB Weapons

Opportunity represents an important potential situational constraint and condition affecting intention toward specific behavioral choices.[128] It typically arises as an unsought favorable circumstance–a serendipitous event. In the context of CBW, opportunity can be a found cache of chemical or biological weapons or a new group member with specialized skills, knowledge, or connections.

A group can create near or longer-term opportunity by relocating closer to an area with a greater variety of resources to leverage. An extremist or criminal group may also create and then capitalize on the failures of the state to provide protection or services to the populace.[129] According to the Theory of Planned Behavior, individuals or group members who assess there are sufficient resources, opportunity, and few obstacles for pursuing specific behaviors would be more likely to attempt the behaviors.[130]

Others can create opportunity to stimulate interest in weapons or technology. Smugglers, organized crime groups, arms dealers, and

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[126] Combating Terrorism Center, *The Islamic Imagery Project*, 98.
[127] David Harris, "The Islamic State's (ISIS, ISIL) Magazine," Clarion Project, September 10, 2014, available at: *https://clarionproject.org/islamic-state-isis-isil-propaganda-magazine-dabiq-50/*.
[128] Vroom, *Work and Motivation*; Harry C. Triandis, *Interpersonal Behavior* (Monterey, CA: Brooks/Cole Publishing Company, 1977); Marcus Felson and Ronald V. Clarke, *Opportunity Makes the Thief: Practical Theory for Crime Prevention,* vol. 98, *Police Research Series Paper* (London, UK: Research, Development and Statistics Directorate London, 1998).
[129] Ackerman, *More Bang for the Buck*; Amy Pate, Gary A. Ackerman, and John Sawyer, Extremist Pathways to Power: From Extremist Ideologies to State Dogma, Final Report for the Strategic Multilayer Assessment Office South Asia Stability Assessment (College Park, MD: START| DHS, 2013).
[130] Ajzen, "The Theory of Planned Behavior," 179-211.

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terrorist groups often trade in arms and illegal commodities for profit or to establish markets as part of their broader operations.[131]

> EXAMPLE: "ISIL is…reportedly interested in acquiring chemical weapons from old Iraqi sites - two bunkers that still contain a stockpile of old weapons - which were once Saddam Hussein's premier chemical weapons production facility."[132]

Group Ideology, Values, and Goals Support Use of CB Weapons

Some qualitative terrorism analysis has supported the view that groups with certain types of ideology are more likely than other groups to engage in extreme violence or use unconventional weapons.[133] Hoffman has observed that religion may be used to legitimize violence against opponents.[134] Other research, however, suggests that ideology may contribute much less in predicting whether a particular group may use WMD and, specifically, CBW.[135]

Whether and how group ideology, values, and goals is related to the use and method of violence remains an empirical question which requires a more granular analysis. Nonetheless, ideology, values, and goals can provide insights into whether a group presented with an opportunity to acquire or use CBW would take advantage of it.

A group's ideology functions partly as an indicant of the group's identity ("this is who we are") and is important for group loyalty, cohesion, acceptance of group norms, and in the selection of potential allies or partners.[136] Group members who are committed to the group's ideology and values may also be more committed to accomplishing the group's tasks even if it requires violence.[137] Group leaders whose beliefs and values

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[131] Helfstein Scott and John Solomon. "Risky Business: The Global Threat Network and the Politics of Contraband." *Combating Terrorism Center*, May 2014, available at: *https://www.ctc.usma.edu/v2/wp-content/uploads/2014/05/RiskyBusiness_final.pdf*.

[132] NATO, "Fighting Weapons of Terror," in *Book Fighting Weapons of Terror*, [Electronic article] (Brussels: North Atlantic Treaty Organization, September 4, 2015), available at: *http://www.nato.int/cps/en/natohq/news_122272.htm*.

[133] Post, "Differentiating the Threat of Chemical and Biological Terrorism,"187; Bruce Hoffman, *Holy Terror: The Implications of Terrorism Motivated by a Religious Perspective* (Santa Monica, CA: RAND Corporation, 1993); Bruce Hoffman, *Inside Terrorism* (New York, NY: Columbia University Press, 1998).

[134] Hoffman, *Holy Terror*.

[135] Victor Asal, Gary A. Ackerman, and R. Karl Rethemeyer, "Connections Can Be Toxic: Terrorist Organizational Factors and the Pursuit of CBRN Weapons," *Studies in Conflict & Terrorism* 35 (2012): 229-54.

[136] de la Corte, "Explaining Terrorism"; Post, "Group and Organizational Dynamics of International Terrorism"; Post, "Differentiating the Threat of Chemical and Biological Terrorism," 187.

[137] Horgan, "Discussion Point: The End of Radicalization?"

support the use of CBW in attacks against the group's targets can affect member acceptance through the strength of their influence over the group, through selective rewarding of violent behavior, and with social frames that support CBW use. However, groups may resist or reject outright weapons or tactics innovations that are not consistent with a group's ideology.[138]

Because research has not sufficiently addressed the relationship between a group's ideology and the use of CBW, this indicator is a topic for future research. Importantly, the level of analysis must distinguish among the ideologies of specific groups. The question is not whether groups with religious ideologies are more likely to use violence or CBW, but rather what about religious (or other) ideologies will influence a group's actions.

> EXAMPLES: Aum Shinrikyo's ideology included belief in an apocalyptic war, which the cult would survive only by arming itself with "powerful weapons including biological and chemical agents."[139]

> The ideologies, values, and beliefs of groups such as al Qaeda, The Covenant, the Sword, and the Arm of the Lord, Hamas, and Jemaah al Islamiyah support or are interpreted to support or justify the use of violence to defend against and defeat perceived enemies.[140]

Application and Future Research

The conceptual model of CBW intent described in this article is the basis for a computational CBW model which analysts can test and apply.[141] The development and evaluation of the computational model is a critical next step for our research program in CBW. Once in computational form, the conceptual CBW Intent Model can be empirically evaluated as a statistical model for the existence and strength of proposed relationships.[142] With

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[138] Ackerman, "More Bang for the Buck."
[139] David E. Kaplan, "Aum Shinrikyo (1995)."
[140] Luis de la Corte, "Explaining Terrorism"; Kim Cragin, "Understanding Terrorist Ideology," in *Understanding Terrorist Ideology*, (Santa Monica, CA: RAND Corporation, 2007); Rohan Gunaratna, "Ideology in Terrorism and Counter Terrorism: Lessons from Combating Al Qaeda and Al Jemaah Al Islamiyah in Southeast Asia" (Conflict Studies Research Centre Discussion Paper), (Shrivenham, UK: Defense Academy of the United Kingdom, 2005).
[141] Examples of transitioning a conceptual model into a computational model—such as a Bayesian network—are presented in Whitney et al. 2011; James L. Regens et al., "Probabilistic Graphical Modeling of Terrorism Threat Recognition Using Bayesian Networks and Monte Carlo Simulation," *Journal of Cognitive Engineering and Decision Making* 9, no. 4 (2015): 295-311; and Whitney, White, and Dalton (2014).
[142] Walsh and Whitney, "A Graphical Approach," 961-78; Paul Whitney and Stephen Walsh, "Calibrating Bayesian Network Representations of Social-Behavioral Models"

sufficient data, interactions among the identified indicators can also be evaluated. Formal elicitation from experts leading to quantitative data is also available to inform the computational model.[143]

Testing the application of the computational CBW model will use readily available, processed data, such as those from the University of Maryland START Center, historical summaries, and news reporting on groups of interest.[144] Because parts of the conceptual model correspond with activities that occur more frequently than the use of CBW (for example, general political violence), it is expected that some parts of the model will be more precisely calibrated than others. Once the computational model is developed, it can be used for multiple purposes. First is to identify and prioritize indicators to monitor or track intent to use CBW in groups. Second, the computational model can be used to quantify the status of tracked groups on each indicator to determine their risk for violent acts and use of CBW. Finally, the computational model can be used to track changes in group status on all indicators to identify change in risk.

Given the potentially large amount of information analysts review daily, it is impractical to expect anyone to apply the model as part of daily information review without additional assistance. To that end, the computational CBW model will be incorporated into a *model-based analysis* software system to address both the scale of the data and the complexity of the model. As information related with CBW intent is collected, the envisioned computational framework will support computational evaluations of the CBW model. Questions to address will include whether there are detectable regional variations in the expression of CBW intent, and how well the CBW Intent Model–developed considering non-state actors–captures state actors' intent regarding use of violence and CBW. The framework for the conceptual CBW Intent Model and the approach for developing, testing, and using the computational

(paper presented at *Advances in Social Computing: Third International Conference on Social Computing, Behavioral Modeling, and Prediction* (SBP 2010), Bethesda, MD, March 30-31, 2010).

[143] Angela Dalton et al., "Expert Elicitation Method Selection Process and Method Comparison," in *Expert Elicitation Method Selection Process and Method Comparison* (Labsi Experimental Economics Laboratory Paper), (Sienna, Italy: University of Siena, 2010), available at: *http://econpapers.repec.org/paper/usilabsit/030.htm*; Steven Walsh, Angela Dalton, Paul Whitney, and Amanda White, "Parameterizing Bayesian Network Representations of Social-Behavioral Models by Expert Elicitation" (Paper presented at *Intelligence and Security Informatics (ISI), 2010 IEEE International Conference* on, May 23-26, 2010); Gary Ackerman, Jeffery Bale, and R. Karl Rethemeyer. "Anatomizing Radiological and Nuclear Non-State Adversaries." Project Report, Center for the Study of Terrorism and Responses to Terrorism, University of Maryland, 2014, available at: *http://www.start.umd.edu/research-projects/anatomizing-radiological-and-nuclear-non-state-adversaries*.

[144] Defense Intelligence Agency, "Dynamic Group Assessment Methodology"; Helfstein and Solomon, "Risky Business."

model map to other settings. Potential applications include general political violence, terrorism, and intent of non-state actors to use radiological and nuclear WMD.

While the model incorporates indicators for the most important factors related to interest and intent to use CBW, we may test other indicators in the future to determine their contribution to predicting intent. Future research should also include model validation using data sets and case studies of a large number and variety of groups. Ideally, the groups should vary across factors that can affect group or organizational decisions related to size, maturity, structure, founding member beliefs and values, primary objectives for existence, membership, leadership, stakeholder influence, and geographical location.[145]

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[145] John A. Wagner, John R. Hollenbeck, and June Russell, *Management of Organizational Behavior* (Prentice Hall, 1995).