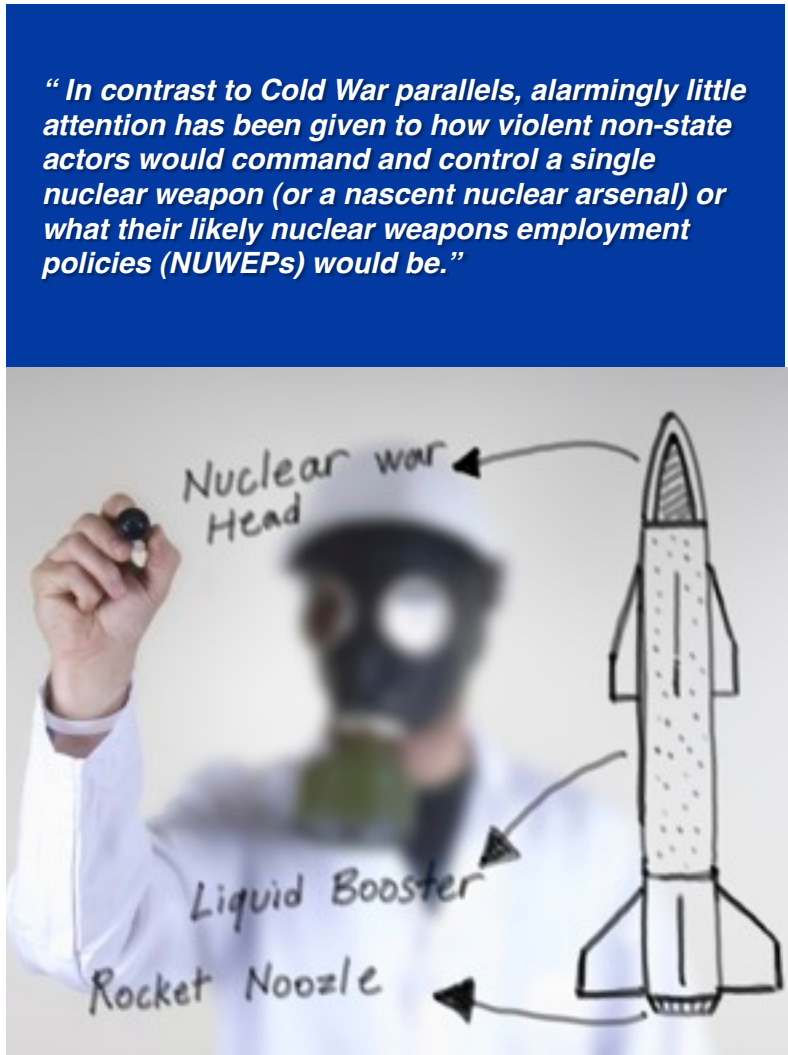


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“ In contrast to Cold War parallels, alarmingly little attention has been given to how violent non-state actors would command and control a single nuclear weapon (or a nascent nuclear arsenal) or what their likely nuclear weapons employment policies (NUWEPs) would be.”

Since the advent of mass-casualty terrorism, along with concomitant concerns over the use of chemical, biological, radiological, and nuclear (CBRN) weapons to achieve such ends, two parallels with Cold War nuclear paradigms have emerged. First, the United States is revisiting Cold War issues of civil defense and post-attack Continuity of Government (CoG) in preparation for actual terrorist employment of nuclear weapons on U.S. soil. ¹ Second, there has been renewed scholarship—amid much speculation—about the technical obstacles violent non-state actors

(VNSAs) face in attempting to fabricate improvised nuclear devices (INDs), capability and opportunity requirements for procurement of “off the shelf” nuclear weapons, and the likelihood and location of a domestic nuclear event. ²

In contrast to these Cold War parallels, alarmingly little attention has been given to how VNSAs would command and control a single nuclear weapon (or a nascent nuclear arsenal) or what their likely nuclear weapons employment policies (NUWEPs) would be. ³ By limiting themselves to investigating only the general requirements necessary to

attain a nuclear capability, contemporary scholars and analysts of the nexus between VNSAs and nuclear weapons bolster misguided assumptions that the *capability* to fabricate or obtain nuclear weapons tells us something about the manner of *employment* of that weapon. In short, most present perceptions of the possible marriage between VNSAs hostile to the United States and nuclear weapons foresee an immediate effort to use such devices against population centers within the United States, its territories or interests abroad, or its allies. Such a myopic view ignores the very real possibility that nuclear-armed



VNSAs could use pragmatic, cogent, and highly effective NUWEPs backed-up by complex and effective nuclear command and control structures.

Should the United States find itself facing such a nuclear-armed non-state adversary, the ability to successfully deter, prevent, preempt, react, or retaliate to a nuclear attack would be influenced by an understanding of that group's own perceived value of nuclear weapons and the arrangements the group has made to ensure that the weapon's perceived utility is maintained before, during, and after confronting its opponent.⁴ Unfortunately, contemporary nuclear command and control paradigms either reflect Cold War assumptions or, with regard to VNSAs, presuppose dangerously narrow perceptions of the utility of nuclear weapons, custodial and employment options and targeting predilections.

The Potential Hazards of Enemy Decapitation: Authoritative and Delegative Command and Control Systems

The most troubling limitation to these antiquated and incompatible models lies in their inability to assess accurately if a given VNSA will employ, with regard to nuclear weapons, an *authoritative* or a *delegative* command and control system.⁵ The former—where the decision to employ nuclear weapons is retained solely by a top leader(s)—allows the United States “decapitation” options against leadership centers to prevent or respond to an attack.⁶ In contrast, a delegative system— an arrangement in which subordinate commanders are authorized to make nuclear employment decisions under certain defined circumstances— occludes decapitation opportunities;

attempts to destroy a terrorist group's top-leadership, even if successful, might trigger the nuclear attack they were intended to neutralize.⁷ In short, in the lead-up to a preemptive strike on a nuclear-armed VNSA or in the immediate aftermath of an attempted or successful nuclear strike on the United States or its interests, U.S. leadership's calculations about the authoritative or delegative nuclear command and control system employed by VNSAs will be of cardinal importance.

Command & Control Clues Found in Social and Organizational Psychology

Accordingly, the Terrorism Analysis Project of the Federation of American Scientists (FAS) is engaged in an eighteen-month study focusing on how VNSAs will approach and solve the challenges inherent in nuclear command and control.⁸ There is no doubt that procurement by terrorists of a nuclear weapon would be a revolutionary occurrence; however, it may be possible to predict—and influence—variables that affect how the drama might unfold. As J. Robert Oppenheimer recalled just months after the nuclear bombings of Hiroshima and Nagasaki, “Nothing can be effectively revolutionary that is not deeply rooted in human experience.”⁹ Indeed, significant methodological elements of FAS's study—“Non-State Actor Nuclear Command & Control”— investigate established command and control paradigms.

First, for example, findings in social and organizational psychology may reveal important clues about the universal variables inherent in how dominion and delegation are balanced in complex and critical human interactions. The organizational cultural model created by

the influential organizational psychologist Edgar Schein dictates that outsider discernment of the true nature of an organization— its resolution of the problem of external adaptation and internal integration (e.g., how a VNSA might construe nuclear command and control)—is not possible through examination of its visible behavior, its statements or its creed.¹⁰ Similarly, fundamental elements of the organization's identity are not accessible with an understanding of its stated values and attitudes. Rather, according to Schein, the underlying and driving elements that determine the organization's identity are determined largely by a group's tacit assumptions—the unseen elements of a group's culture that are often unspoken. In short, some branches of organizational and leadership studies imply, the best way to predict the types of complex and novel interactions inherent in a VNSA's nuclear command and control is to go beyond the clues offered by cultural artifacts and its professed organizational nature; true organizational apprehension is only possible through an understanding of unstated, often taboo, assumed rules and “norms” of behavior.

State Nuclear Command & Control Paradigms

In contrast to the value of endogenously constructed cultural and organizational norms implied by organizational and social psychology, vis-à-vis their utility in unraveling potential VNSA command and control structures, a second methodological approach of FAS's study involves more traditional investigations of *state* nuclear management arrangements—partially exogenous



variables. Useful open source investigations exist about the variables likely to influence a state's perception of optimal nuclear command and control structures.¹¹ Peter Feaver, for example, suggests that the greater the "time urgency"—e.g., how quickly an arsenal must be made ready for rapid and immediate use—the more likely the command and control system will be delegative.¹² Some key factors in this regard are the size of the state's arsenal and its proximity to the threat, risk of high precision weapons in the enemy's arsenal (leading to increasing odds of decapitation), and *inter alia* lack of "geographic depth" in which to situate an arsenal.¹³ Such physical circumstances might drastically reduce deployment options exposing the few available locations to enemy surveillance. By exploring the similarities and differences between state nuclear command and control and other variables believed to play a potential role in VNSA nuclear management arrangements, it may

be possible to discern if certain variables, akin to "time urgency," are "structural"—if they are inescapably inherent to the issue of nuclear command and control and *must* be confronted by nuclear-armed VNSAs regardless of their internal qualities (e.g., organizational culture) or past behavior.¹⁴

Terrorists and Previously Displayed Command & Control Arrangements

FAS's Non-State Actor Nuclear Command & Control study also investigates demonstrated VNSA command and control arrangements. Due to their relative paucity, examinations of VNSA CBRN incidents are supplemented with a robust investigation into the command and control arrangements discernable in *conventional* terrorist attacks.¹⁵ Academics have catalogued more than 87,000 incidents of terrorism, attributable to about 2,000 different groups.¹⁶ To cover the full spectrum of VNSAs, groups are considered from all the ideological categories: Nationalist/separatist/irredentist (Ethno-Nationalist) groups; secular left-wing groups; secular right-wing groups; religious terrorist groups; and single-issue groups.¹⁷ However, by "concentrating on actual terrorist organizations, or components of those organizations, that regularly displayed or continue to display 'operational sophistication,' project researchers have narrowed those VNSAs being considered to less than 100 groups.¹⁸ Research is ongoing; however, it is immediately obvious that numerous factors affecting displayed VNSA command and control

arrangements are largely ecumenical. These include the variables of ideology, perceptual filters, organizational structure, organizational dynamics, organizational life cycle status, relations with external actors, demographics, resources, operational capabilities, operational objectives, attack modalities, and target selection.¹⁹

"Nothing can be Effectively New in Touching the Course of Men's Lives That is Not Also Old"²⁰

Factors influencing VNSA nuclear command and control structures are likely to be numerous. However, by identifying pertinent variables extant in social and organizational psychology, it is possible to develop theories of state nuclear command and control, and assess VNSA CBRN and conventional command and control structures, and form a framework with predictive application. Thus, subsequent aspects of the study involve "testing" the framework with subject matter experts, applying the resulting modified model to actual VNSAs, and extrapolating their likely nuclear command and control structure.

Oppenheimer observed that the scientific and military revolutions precipitated by the release of atomic energy were "surely not because...it [has] no analogue in our late history. It is precisely because that history has so well prepared us to understand what these things may mean."²¹ So too, it is hoped that FAS's study will demonstrate if non-state actor nuclear command and control can be predicted—and influenced—through investigation of recent and more distant sociological, psychological, strategic, and political forces and developments. **FAS**

ENDNOTES

1. See, for example, National Security Presidential Directive/NSPD 51, May 9, 2007. The White House, available at: <http://www.fas.org/irp/offdocs/nspd/nspd-51.htm>

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2. For capability requirements and material procurement obstacles and opportunities see Charles D. Ferguson et al., *The Four Faces of Nuclear Terrorism* (Monterey, CA: Center for Nonproliferation Studies, 2004) and Michael Levi, *On Nuclear Terrorism* (Cambridge, MA: Harvard University Press, 2007), cf. Robin Frost, "Nuclear Terrorism After 9/11," Adelphi Papers, December 2005. For explorations of violent non-state actors' motivations for engaging in nuclear attacks see Brian Michael Jenkins, *Will Terrorists Go Nuclear?* (Amherst, NY: Prometheus Books, 2008), esp. chapters 3-5, 10, 14-15 and Jeffrey M. Bale and Gary Ackerman, "How Serious is the 'WMD Terrorism' Threat?: Terrorist Motivations and Capabilities for Using Chemical, Biological, Radiological, and Nuclear (CBRN) Weapons," report prepared by the WMD Terrorism Research Program, Center for Nonproliferation Studies, 2005, Part II on motivations.
3. The command and control elements of terrorists writ large has been explored, although much more work needs to be done in this broad area. See, for example, Brian A. Jackson, "Groups, Networks, or Movements: A Command-and-Control-Driven Approach to Classifying Terrorist Organizations and Its Application to Al Qa'ida," *Studies in Conflict and Terrorism*, Vol. 29, No. 3, April-May 2006, 241-162 and Bryan C. Price, B. "Removing the Devil You Know: An Empirical Analysis of Leadership Decapitation and Terrorist Group Duration" Paper presented at the annual meeting of the Theory vs. Policy? Connecting Scholars and Practitioners, New Orleans Hilton Riverside Hotel, The Loews New Orleans Hotel, New Orleans, LA, Feb 17, 2010.
4. VNSAs could perceive of a nuclear weapon as a political tool; a means towards statehood; an element of blackmail; a weapon of revenge, punishment, economic disruption, deterrence or last resort. Moreover, VNSAs with an apocalyptic eschatology might see nuclear weapon use as precipitating a purifying global Armageddon. For an excellent study of the nexus between such millenarian VNSAs and CBRN weapons see Robert Jay Lifton, *Destroying the World to Save It: Aum Shinrikyō, Apocalyptic Violence, and the New Global Terrorism* (New York: Metropolitan Books, 1999). See also Charles P. Blair, "Jihadists and Nuclear Weapons," in Gary Ackerman and Jeremy Tamsett, eds., *Jihadists and Weapons of Mass Destruction: A Growing Threat* (New York: Taylor and Francis, 2009), 193-195.
5. Seminal works that explore these systems include Paul Bracken, *The Command and Control of Nuclear Weapons* (New Haven, and London: Yale University Press, 1983); Bruce G. Blair *Strategic Command and Control: Redefining the Nuclear Threat* (Washington, D.C: Brookings Institute Press, 1985); Peter D. Feaver, "Command and Control in Emerging Nuclear States," *International Security*, Vol.17, No. 3 (Winter 1992/93); Bruce G. Blair, *The Logic of Accidental Nuclear War* (Washington: The Brookings Institute, 1993); and Scott D. Sagan, "The Origins of Military Doctrine and Command and Control Systems" in Peter R. Lavoy, Scott D. Sagan, and James J. Wirtz, eds., *Planning the Unthinkable* (Ithaca and London: Cornell University Press, 2000).
6. With regard to nuclear-armed state actors, Peter Feaver has described decapitation as "an enemy nuclear attack against command and control centers, particularly against the national leadership . . . which would render the [state] unable to respond even if a sizable portion of the . . . nuclear arsenal survived." Peter D. Feaver, *Guarding the Guardians: Civilian Control of Nuclear Weapons in the United States* (Ithaca: Cornell University Press, 1992), 73-74. In the case of nuclear-armed VNSAs, decapitation refers to an attack that renders the group incapable of employing (additional) nuclear weapon(s) even if in a post-attack environment the group still has possession of such weapon(s). For a seminal early discussion of decapitation see John D. Steinbruner, "Nuclear Decapitation," *Foreign Policy*, no. 45 (Winter 1981-82), 16-28.
7. This is the case in both 1) preemptive attacks—those aimed at preventing an initial nuclear attack and 2) responsive assaults precipitated by a successful or attempted nuclear attack—military responses intended to prevent further nuclear attacks. The opportunities—and risks—afforded states engaging in predelegation of nuclear weapons are explored in Peter J. Roman, "Ike's Hair-Trigger: U.S. Nuclear Predelegation, 1953-60," *Security Studies* 7, no. 4 (Summer 1998), 121-164. See also, Richard H. Kohn and Joseph P. Harahan, eds., "U.S. Strategic Air Power, 1948-1962: Excerpts from an Interview with Generals Curtis E. Lemay, Leon W. Johnson, David A. Burchinal, and Jack J. Catton," *International Security* 12, no 4 (Spring 1988), 78-95.
8. This study is in collaboration with the National Consortium for the Study of Terrorism and Responses to Terrorism (START), a U.S. Department of Homeland Security Center of Excellence; it is part of a multi-year START project which includes inter alia Gary A. Ackerman, Charles P. Blair, Jeffrey M. Bale, Victor Asal and R. Karl Rethemeyer, *Anatomizing Radiological and Nuclear Non-State Adversaries: Identifying the Adversary*. Report prepared for the Science and Technology Directorate, Department of Homeland Security, grant number N00140510629 (College Park, MD.: National Consortium for the Study of Terrorism and Responses to Terrorism, 2009); Gary A. Ackerman, Charles P. Blair and Maranda Sorrells, *Radiological and Nuclear Non-State Adversaries Database (RANNSAD)*. (College Park, MD: National Consortium for the Study of Terrorism and Responses to Terrorism, 2009); and Gary A. Ackerman, Charles P. Blair, and Jeffrey M. Bale, *Anatomizing Radiological and Nuclear Non-State Adversaries: Potential RN Adversary Behavioral Profiles*. Report prepared for the Science and Technology Directorate, Department of Homeland Security, grant number N00140510629 (College Park, MD.: National Consortium for the Study of Terrorism and Responses to Terrorism, 2010).

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9. Robert Oppenheimer, "The New Weapon: The Turn of the Screw," in The Federation of American Scientists', *One World or None* (New York: McGraw Hill, 2007), 59. This volume was originally published in 1946.
10. Edgar Schein, *Organizational Culture and Leadership*, 4th Ed. (San Francisco: Wiley, 2010), passim.
11. See endnote #5.
12. Feaver, "Command and Control in Emerging Nuclear Nations," 178.
13. Ibid, 180.
14. The "Always/Never Dilemma" captures systemic structural variables putatively encountered by states. According to Feaver all possessors of nuclear weapons, including new nuclear states, confront an inescapable dilemma. If a leader's control of the weapons is too relaxed, deterrence can "fail deadly" in the form of an accidental or unauthorized launch. However, if control is too firm, deterrence can "fail impotent" if the leadership is decapitated and has no chance of retaliation. In differentiating between these two goals, authorities are forced to choose between a more assertive or more delegative command and control system. Feaver, "Command and Control in Emerging Nuclear States," passim.
15. Radiological and nuclear (RN) cases, for example (including plots, attempted acquisitions, possession of materials, threats with possession, and use of RN materials as a weapon), more substantial than a mere threat number 131 incidents (as of early 2010). When excluding dubious end-users and likely apocryphal cases, the total falls to less than 80. Almost half of the perpetrators in these cases were lone actors and, with regard to all incidents, most were interdicted during their plotting phase. Ackerman, Blair and Sorrells, Radiological and Nuclear Non-State Adversaries Database (RANNSAD).
16. See START's Global Terrorism Database (GTD), available at: <http://www.start.umd.edu/gtd/>.
17. See Gary Ackerman, Jeffrey M. Bale, Charles P. Blair, et al., "Assessing Terrorist Motivations for Attacking Critical Infrastructure." Lawrence Livermore National Laboratory, UCRL-TR-227068, December 4, 2006, 16-18, available at: <https://e-reports-ext.llnl.gov/pdf/341566.pdf> .
18. This author is indebted to Jeffrey M. Bale and Jarret Brachman for their assistance in creating a framework that narrows incidents and groups down to those that are relevant to the study. Quotation is taken from author's correspondence with Jeffrey M. Bale, Director, Monterey Terrorism Research and Education Program, July 29, 2010. Autonomous, "bottom-up" cells created by rank amateurs are largely immaterial to the study. This is because, "Although amateurs occasionally do manage to carry out successful and highly destructive single attacks, these are not usually marked by a high degree of sophistication, either with respect to technical or operational capabilities (e.g., the Madrid bombings). In short, the tradecraft employed by amateur, i.e., non-professional, terrorist groups is not usually of a very high order even in those relatively few cases where they are able to carry out surprisingly successful attacks." Bale, correspondence with author.
19. For more on these key factors see, Ackerman, Bale, Blair, et al, "Assessing Terrorist Motivations for Attacking Critical Infrastructure," 20-23.
20. Oppenheimer, "The New Weapon: The Turn of the Screw," 59.
21. Ibid, 59-60.

Charles P. Blair joined FAS in June 2010 as Director of the Terrorism Analysis Project. An expert in radiological and nuclear weapons, Blair's work focuses on the nexus of violent non-state actors and weapons of mass destruction (WMD). Prior to joining FAS, he was a research associate with the National Consortium for the Study of Terrorism and Responses to Terrorism where, among other projects, he managed the Global Terrorism Database, the largest open-source compilation of terrorist events in the world.

Since 2005 Blair has co-directed the Center for Terrorism and Intelligence Studies (CETIS). Largely serving the needs of U.S. governmental agencies, CETIS studies terrorist targeting and decision making as they relate to critical infrastructure vulnerability. Previously Blair served as a research associate at the Center for Nonproliferation Studies' (CNS) Monterey Terrorism Research and Education Program and as an investigative researcher for the Anti-Defamation League (ADL).

A dual U.S./French citizen, Blair has studied in France, India and the former Soviet Union. He holds a B.A. in history from the University of Colorado at Boulder and an M.A. from the Monterey Institute of International Studies in international policy studies with a focus on the technical issues and policies surrounding WMD.

