

New Technologies, New Threats and Warfare in the 21st Century

Political Science 239: Selected Topics in International Relations

Spring 2020

Friday 2:00 - 4:50 pm, 4276 Bunche Hall

Office hours: TBD, and by appt.

<https://moodle2.sscnet.ucla.edu/course/view/20S-POLSCI239-1>

Syllabus Vers. 2.0

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Course rationale. There is much discussion nowadays of new technologies and non-traditional security threats. We hear of new weapons technologies, new weapons systems, new threats, new forms of warfare, and a revolution in military affairs (RMA). Despite the fact that such discussions are not new in the history of warfare, technology, and weaponry, they have taken on a new sense of urgency. There is the feeling that an array of new technologies are coming online simultaneously and that they may require a rethinking of traditional concepts of national security and warfare. New weapons system being discussed include lethal autonomous weapons systems (LAWS, more colloquially described as killer robots), hypersonic planes, and directed energy weapons (lasers). Then there are technological developments and prospective applications that are so broad that they transcend conventional characterizations of mere weapons systems but portend a change in the nature of the battlefield. These include new information and communications technologies (ICTs), such as cyber, and digital technologies, such as artificial intelligence (AI) and quantum computing. Serious scientists are concerned that new technologies pose an existential risk and threaten the future of humanity. Driven by such concerns the University of Oxford established a Future of Humanity Institute, the University of Cambridge established a Centre for the Study of Existential Risk, and the UC Berkeley Center for Catastrophic Risk Management.

Throw into this mix, new realities that many are treating as new non-traditional security threats. Most prominent among is climate change. But a look at government documents, in the US and elsewhere, about security challenges generates a large list of non-traditional security concerns including:

1. Environmental degradation including climate security,
2. Economic disparities,
3. Chronic poverty,
4. Diseases and pandemics,
5. Trans-national crimes, human trafficking and drugs,
6. Migration,
7. Energy, water and food,
8. Resource wars,
9. Disaster management (including role of military in disaster relief),
10. Terrorism,
11. Corruption, and
12. Responsibility to Protect

Note that this list comes from the Manohar Parrikar Institute for Defence Studies and Analyses (IDSA) in India. These issues may or may not be appropriate concerns for military and defense establishments. We will discuss the issue of climate change, which the Obama Administration officially highlighted as having potential implications for US national security. That discussion will perhaps be more broadly applicable to the other issues listed above.

The point of this course is to assess the analytic implications of new technologies for national security. We will ask what is new about the new technologies? Do they pose challenges unlike those posed by earlier innovations? If not, are past conceptualizations, doctrines, and policies applicable to these new forms of warfare? If they do pose distinctly different challenges, what new concepts and categories do we need to understand their impact and to respond to them?

Past technological developments in the nature of warfare generated an array of efforts at mitigation: to ban, to limit, to regulate, to control. The historical record includes efforts to negotiate arms control agreements, the development of new norms and international law, and the creation of international institutions. We will discuss the requisites for such developments, and which new technologies are conducive to them, and which pose unusual challenges for prospective governance efforts.

Requirements. Doing the reading. Attending class sessions. Writing a paper of publishable quality about a new technology and its military possibilities. The paper should address the kinds of questions we will discuss in the course.

- What weapons systems envision the technology?
- How does it differ from past systems? Is it transformative or revolutionary? If so, in what way?
- What aspect of warfare they affect?
- Are they extensions of past developments or hold the prospect of transforming warfare.
- Does the technology and the weapons advantage the offense or defense?
- What are the prospects for deterrence or defense?
- How do/would the weapons affect strategy or tactics in warfare?
- How do/would the technology/weapons affecting organizations and decision making?
- What are the implications for strategic stability?
- What are the prospects for the emergence of new norms? for arms control?
- Does the technology/weapon pose peculiar challenges for international agreement?
- How do the prospective weapons relate to the laws of war?

Schedule of sessions

1. Introduction: National security, threats, and the role of the military
2. Technology and War
3. Offense/defense/ nukes
4. Offset technologies: Hypersonic weapons, directed-energy weapons, quantum computing, synthetic biology
5. Cyberwarfare
6. Autonomous Weapons
7. Artificial Intelligence (AI)
8. Governance, International Norms and Law
9. Climate Change
10. Global Health

1 Introduction: National defense, national security, and the role of the military

What are matters of national defense and national security (note that security has replaced defense as the common term for the field)? What are the objectives the military is meant to fulfill: defense, offense, deterrence? Does the military have a role in defending the nation against every threat (disease, climate change, terrorism)? What is the process by which issues become matters of national security (i.e., securitization)? What is the role of technology?

Wolfers, Arnold. 1952. "National Security" as an Ambiguous Symbol. *Political Science Quarterly* 67 (4): 481-502.

Weiss, Charles. 2005. Science, Technology and International Relations. *Technology in Society* 27(3): 295-313.

Craig, Anthony J. S. and Brandon Valeriano. 2017. Power, Conflict, and Technology: Delineating Empirical Theories in a Changing World. *Oxford Research Encyclopedia of Politics* Sept. Read pages 1-6.

Eriksson, Johan and Giampiero Giacomello. 2006. The Information Revolution, Security, and International Relations: (IR) Relevant Theory. *International Political Science Review* 27 (3): 221-244.

Rugge, Fabio. 2019. Emerging Disruptive Technologies and International Stability. In *The Global Race for Technological Superiority*, edited by Fabio Rugge, 13-54. ISPI (Istituto per gli Studi di Politica Internazionale) and the Brookings Institution. Milano, Italy: Ledizioni LediPublishing.

Levite, Ariel E. and Jonathan (Yoni) Shimshoni. 2018. The Strategic Challenge of Society-Centric Warfare. *Survival* 60(6): 91-118.

Rizzo, Gabriele. 2019. Disruptive Technologies in Military Affairs. In *The Global Race for Technological Superiority*, edited by Fabio Rugge, 55-92. ISPI (Istituto per gli Studi di Politica Internazionale) and the Brookings Institution. Milano, Italy: Ledizioni LediPublishing.

2 Technology and War

How has technology affected the ways wars are fought? What aspects of warfare are being described and assessed? What does this imply for what we should look for in assessing the impact of new technologies? What constitute transformative technological developments (revolutions in military affairs (RMAs)? Create a chart of the technological developments listed by each author, what impact they had on warfare, and whether they are thought to have constituted a revolution in military affairs.

Van Creveld, Martin. 2000. Technology and War I: To 1945. In *The Oxford History of Modern War*, edited by Charles Townshend, 201-223. Oxford: Oxford University Press.

Van Creveld, Martin. 2000. Technology and War II: Postmodern War? In *The Oxford History of Modern War*, edited by Charles Townshend, 341-359. Oxford: Oxford University Press. Read pages 350-359.

Van Creveld, Martin. 1991. Conclusions: The Logic of Technology and of War. In *Technology and War: From 2000 BC to the Present*, Revised and expanded ed. New York: The Free Press. (10pp)

Murray, Williamson and MacGregor Knox. 2001. Thinking About Revolutions in Warfare. In *The Dynamics of Military Revolution, 1300-2050*, edited by MacGregor Knox and Williamson Murray, ch. 1, 1-14. Cambridge: Cambridge University Press.

Murray, Williamson and MacGregor Knox. 2001. Conclusion: The Future Behind Us. In *The Dynamics of Military Revolution, 1300-2050*, edited by MacGregor Knox and Williamson Murray, Ch. 10, 175-194. Cambridge: Cambridge University Press.

Van Creveld, Martin. 2017. Perspectives: Change, Continuity, and the Future. In *More on War*, 191-208. Oxford: Oxford University Press.

3 Offense, Defense, Deterrence, and the Nuclear Revolution

International relations scholars argue that technologies and weapons system that embody them confer advantages on the offense or the defense with large implications for international politics and system stability. What is the theory? What are the debates in the literature? How are past weapons systems characterized? How has the theory been assessed? How did nuclear weapons affect the argument?

3.1 Offense, Defense

- Craig, Athony J. S. and Brandon Valeriano. 2017. Power, Conflict, and Technology: Delineating Empirical Theories in a Changing World. *Oxford Research Encyclopedia of Politics* Sept. Read pages 6-8.
- Van Evera, Stephen. 1998. Offense, Defense, and the Causes of War. *International Security* 22 (4). Look at figure 1 and table 1 on pages 12 and 24. Then read pages 34-35, 41-43.
- Levy, Jack S. 1984. The Offensive/defensive Balance of Military Technology: A Theoretical and Historical Analysis. *International Studies Quarterly* 28(2): 219-238.
- Lieber, Keir A. 2000. Grasping the Technological Peace: The Offense-Defense Balance and International Security. *International Security* 25(1): 71-104.
- Biddle, Stephen. 2001. Rebuilding the Foundations of Offense-Defense Theory. *Journal of Politics* 63(3): 741-774.
- Adams, Karen Ruth. 2003. Attack and Conquer? International Anarchy and the Offense-Defense-deterrence Balance. *International Security* 28(3): 45-83.
- Fearon, James D. 2018. Cooperation, Conflict, and the Costs of Anarchy. *International Organization* 72(3). Read pages 541-548.
- Garfinkel, Ben and Allan Dafoe. 2019. How Does the Offense-Defense Balance Scale? *Journal of Strategic Studies* 42(6): 736-763.

3.2 The Nuclear Revolution

- O'Connell, Robert L. 1989. Conclusion: The Era of Nuclear Weapons. In *Of Arms and Men: A History of War, Weapons, and Aggression*, 296-310. New York: Oxford University Press.
- Van Creveld, Martin. 2000. Technology and War II: Postmodern War? In *The Oxford History of Modern War*, edited by Charles Townshend, 341-359. Oxford: Oxford University Press. Read pages 341-350.
- Van Creveld, Martin. 2017. Nuclear War. In *More on War*, 143-157. Oxford: Oxford University Press.
- Jervis, Robert. 1989. The Theory of the Nuclear Revolution. In *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon*, 1-45. Ithaca: Cornell University Press.

4 New weapons systems

Questions to think about as you do the readings

A number of emerging technologies and their prospective military uses are on the table. As you read about each one, ask yourself the questions listed earlier.

4.1 Emerging technologies

Sechser, Todd S., Neil Narang and Caitlin Talmadge. 2019. Emerging Technologies and Strategic Stability in Peacetime, Crisis, and War. *Journal of Strategic Studies* 42(6): 727-735.

4.2 Synthetic biology

Lowe, Christopher. 2019. Biotechnological Innovation, Non-Obvious Warfare and Challenges to International Law. In *Routledge Handbook of War, Law and Technology*, edited by James Gow, Ernst Dijkhoorn, Rachel Kerr and Guglielmo Verdirame, 201-214. New York, NY: Routledge. Skim

Edwards, Brett. 2019. Synthetic Biology as a Techno-Scientific Field of Security Concern. In *Insecurity and Emerging Biotechnology: Governing Misuse Potential*, 35-50. Cham, Switzerland: Springer International Publishing.

Gronvall, Gigi. 2018. The Security Implications of Synthetic Biology. *Survival* 60(4): 165-180.

National Academies of Sciences, Engineering, and Medicine. 2018. Related Developments That May Impact the Ability to Effect an Attack Using a Synthetic Biology Enabled Weapon. In *Biodefense in the Age of Synthetic Biology*, 85-93. Washington, DC: The National Academies Press.

4.3 Quantum computing

Lindsay, Jon R. 2020. Demystifying the Quantum Threat: Infrastructure, Institutions, and Intelligence Advantage. *Security Studies* : 1-27.

International Institute for Strategic Studies. 2019. Quantum Computing and Defence. In *The Military Balance 2019*, 18-20. International Institute for Strategic Studies.

4.4 Additive manufacturing

Volpe, Tristan A. 2019. Dual-Use Distinguishability: How 3D-Printing Shapes the Security Dilemma for Nuclear Programs. *Journal of Strategic Studies* 42(6): 814-840.

4.5 Hypersonic vehicles

Goure, Dan. 2019. Hypersonic War: The Weapons of the Future Have Arrived. *National Interest*, July 12. (4pp)

Klare, Michael T. 2019. An Arms Race in Speed: Hypersonic Weapons and the Changing Calculus of Battle. *Arms Control Today* June. (7pp)

Wilkening, Dean. 2019. Hypersonic Weapons and Strategic Stability. *Survival* 61(5): 129-148.

4.6 Directed energy weapons

Ellis, Jason D. 2015. *Directed-Energy Weapons: Promise and Prospects*. Center for a New American Security. Pages 6-56.

5 Cyberwarfare

Cyberwarfare is already seen as a major development in international conflict. What has been the world's experience with cyberwarfare? What particular challenges does it pose? Does it create a new way of waging war? Does it require new conceptualizations for understanding?

5.1 History

- Stiennon, Richard. 2015. A Short History of Cyber Warfare. In *Cyber Warfare: A Multidisciplinary Analysis*, edited by James A. Green, 7-32. London: Routledge. Skim
- Greenberg, Andy. 2019. The Wired Guide to Cyberwar. *Wired Magazine* August 23. (7 pp.)
- Harris, Mark. 2019. Ghost Ships, Crop Circles, and Soft Gold: A GPS Mystery in Shanghai. *MIT Technology Review*, Nov. 15. (8 pp.) Skim

5.2 Analytic implications

- Betz, David. 2012. Cyberpower in Strategic Affairs: Neither Unthinkable Nor Blessed. *Journal of Strategic Studies* 35(5): 689-711.
- Borghard, Erica D. and Shawn W. Lonergan. 2017. The Logic of Coercion in Cyberspace. *Security Studies* 26(3): 452-481.
- Cavelty, Myriam Dunn and Andreas Wenger. 2019. Cyber Security Meets Security Politics: Complex Technology, Fragmented Politics, and Networked Science. *Contemporary Security Policy* : 1-28.
- International Institute for Strategic Studies. 2016. Cyber Conflict and Deterrence. *Strategic Comments* 22(7). (3 pp.)
- Taddeo, Mariarosaria. 2018. The Limits of Deterrence Theory in Cyberspace. *Philosophy & Technology* 31(3): 339-355.
- Kello, Lucas. 2013. The Meaning of the Cyber Revolution: Perils to Theory and Statecraft. *International Security* 38(2): 7-40.
- Liff, Adam P. 2012. Cyberwar: A New 'Absolute Weapon'? The Proliferation of Cyberwarfare Capabilities and Interstate War. *Journal of Strategic Studies* 35(3): 401-428.
- Lindsay, Jon and Erik Gartzke. 2019. Coercion Through Cyberspace: The Stability-Instability Paradox. In *Coercion: The Power to Hurt in International Politics*, edited by Kelly M. Greenhill and Peter Krause, 179-203. New York: Oxford University Press.
- Schneider, Jacquelyn. 2019. The Capability/Vulnerability Paradox and Military Revolutions: Implications for Computing, Cyber, and the Onset of War. *Journal of Strategic Studies* 42(6): 841-863.

5.3 Data

- Valeriano, Brandon and Ryan C. Maness. 2019. The Dynamics of Cyber Conflict Between Rival Antagonists, 2001–11. *Journal of Peace Research* 51(3): 347-360.

6 Autonomous Weapons

Ongoing conflicts are making extensive use of lethal autonomous weapons systems (LAWS) and more are in the works. How do these weapons affect the nature of warfare? Do they require new conceptualizations?

6.1 Introduction

Scharre, Paul and Michael C. Horowitz. 2015. An Introduction to Autonomy in Weapon Systems. Center for a New American Security, Working Paper, Feb. (23 pp.)
<https://www.cnas.org/publications/reports/an-introduction-to-autonomy-in-weapon-systems>

Sloan, Elinor. 2015. Robotics at War. *Survival* 57(5): 107-120.

6.2 Analytic implications

Bode, Ingvild and Hendrik Huelss. 2018. Autonomous Weapons Systems and Changing Norms in International Relations. *Review of International Studies* 44(3): 393-413.

Etzioni, Amitai and Oren Etzioni. 2017. Pros and Cons of Autonomous Weapons Systems. *Military Review* May-June: 72-81.

Gartzke, Erik. 2019. Blood and Robots: How Remotely Piloted Vehicles and Related Technologies Affect the Politics of Violence. *Journal of Strategic Studies* : 1-31.

Haas, Michael Carl and Sophie-Charlotte Fischer. 2017. The Evolution of Targeted Killing Practices: Autonomous Weapons, Future Conflict, and the International Order. *Contemporary Security Policy* 38(2): 281-306.

Horowitz, Michael C. 2019. When Speed Kills: Lethal Autonomous Weapon Systems, Deterrence and Stability. *Journal of Strategic Studies* 42(6): 764-788.

Scharre, Paul. 2016. Autonomous Weapons and Operational Risk. *Center for a New American Security*, Feb. Read pages 5-54.

7 Artificial Intelligence (AI)

Artificial intelligence has played a role in contemporary life for a while, but new developments portend major transformations, including in weapons and warfare. What aspects of warfare will be affected and do they require new conceptualizations?

Elkus, Adam. 2015. The Importance of History in Technology and Security Policy Analysis. *Small Wars Journal* Dec. 1. (19 pp., 9 of text)

Stefanick, Tom. 2019. AI in the Aether: Military Information Conflict. In *The Global Race for Technological Superiority*, edited by Fabio Rugge, 112-130. ISPI (Istituto per gli Studi di Politica Internazionale) and the Brookings Institution. Milano, Italy: Ledizioni LediPublishing. Read pages 113-114.

Congressional Reference Service. 2019. Artificial Intelligence and National Security. CRS Report R45178. Updated Nov. 21. (42 pp.) Skim

Highnam, Peter. 2019. Department of Defense Artificial Intelligence Initiatives. Before the Emerging Threats and Capabilities Subcommittee, Committee on Armed Services, United States Senate. March 12. (6 pp.)

Horowitz, Michael C. 2018. Artificial Intelligence, International Competition, and the Balance of Power. *Texas National Security Review* 1(3): 36-57.

Payne, Kenneth. 2018. Artificial Intelligence: A Revolution in Strategic Affairs. *Survival* 60(5): 7-32.

Wong, Yuna Huh, John M. Yurchak, Robert W. Button, Aaron Frank, Burgess Laird, Osonde A. Osoba, Randall Harris Steeb, Benjamin N. and Sebastian Joon Bae. 2020. Deterrence in the Age of Thinking Machines. RAND, Publication RR2797. Read pages 1-38, 59-86.

Johnson, James. 2019. The AI-Cyber Nexus: Implications for Military Escalation, Deterrence and Strategic Stability. *Journal of Cyber Policy* 4(3): 442-460.

Brundage, Miles, Shahar Avin, Jack Clark, Helen Toner, Peter Eckersley, Ben Garfinkel, Allan Dafoe, Paul Scharre, Thomas Zeitzoff, Bobby Filar, Hyrum Anderson, Heather Roff, Gregory C. Allen, Jacob Steinhardt, Carrick Flynn, Seán Ó hÉigeartaigh, Simon Beard, Haydn Belfield, Sebastian Farquhar, Clare Lyle, Rebecca Crootof, Owain Evans, Michael Page, Joanna Bryson, Roman Yampolskiy and Dario Amodè. 2018. The Malicious Use of Artificial Intelligence: Forecasting, Prevention, and Mitigation. Future of Humanity Institute, University of Oxford; Centre for the Study of Existential Risk, University of Cambridge; Center for a New American Security; Electronic Frontier Foundation; and OpenAI., February. Read 9-22, 37-43.

8 Governance, International Norms and Law

In the past, new weapons have led to the emergence of new norms and even efforts at international regulation and governance. The readings below discuss the prospects for governance of different technologies and the particular challenges each poses. As you read about each technology and weapons system, ask some of the questions listed at the beginning of the syllabus.

8.1 Synthetic Biology

8.2 Hypersonic Weapons

Williams, Heather. 2019. Asymmetric Arms Control and Strategic Stability: Scenarios for Limiting Hypersonic Glide Vehicles. *Journal of Strategic Studies* 42(6): 789-813.

8.3 Cyber

Libicki, Martin C. 2009. The Dim Prospects for Cyber Arms Control. In *Cyberdeterrence and Cyberwar*, 199-201. Santa Monica, CA: Rand.

Nye, Joseph S., Jr. 2018. Normative Restraints on Cyber Conflict. *Cyber Security: A Peer-Reviewed Journal* 1(4): 331-342.

Maurer, Tim. 2011. Cyber Norm Emergence at the United Nations: An Analysis of the UN's Activities Regarding Cyber-Security. Harvard Kennedy School, Belfer Center for Science and International Affairs, Discussion Paper 2011-11, Sept. pp. 3-34, 47.

Hansel, Mischa, Max Mutschler and Marcel Dickow. 2018. Taming Cyber Warfare: Lessons From Preventive Arms Control. *Journal of Cyber Policy* 3(1): 44-60.

Darnton, Geoffrey. 2006. Information Warfare and the Laws of War. In *Cyberwar, Netwar and the Revolution in Military Affairs*, edited by Edward Halpin, Philippa Trevorow, David Webb and Steve Wright, 139-153. New York: Palgrave Macmillan.

8.4 Autonomous Weapons

Kaag, John and Sarah Kreps. 2014. Drones and International Law. In *Drone Warfare*. New York: Polity Press.

Abney, Keith. 2013. Autonomous Robots and the Future of Just War Theory. In *Routledge Handbook of Ethics and War: Just War Theory in the Twenty-First Century*, edited by Fritz Allhoff, Nicholas G. Evans and Adam Henschke, 338- 351. New York, NY: Routledge.

Sparrow, Robert. 2009. Predators or Plowshares? Arms Control of Robotic Weapons. *IEEE Technology and Society Magazine* 28(1): 25-29.

8.5 Artificial Intelligence

Wong, Yuna Huh, John M. Yurchak, Robert W. Button, Aaron Frank, Burgess Laird, Osonde A. Osoba, Randall Harris Steeb, Benjamin N. and Sebastian Joon Bae. 2020. Deterrence in the Age of Thinking Machines. RAND, Publication RR2797, read chs. 1-4, pp. 1-38, and chs. 7-9, pp. 59-86.

9 Climate change

A host of issues have come to be treated as non-traditional security issues. The one garnering the most attention is climate change. Is climate change a national security issue? How does it affect the military? Although we will only discuss climate change, our discussion will provide some sense of the issues associated with extending the focus of security policy to other issues and concerns. Dealing with climate change raises governance issues as well. Finally, we will also discuss the implications of assessing risk and uncertainty.

9.1 Climate Change as a Security Issue

Freedman, Lawrence. 2017. Mega-Cities and Climate Change. In *The Future of War: A History*. New York: PublicAffairs. Start on p. 6, where it starts “What Was Discussed Much More Was ‘Resource Wars’”.

Goldstein, Joshua S. 2016. Climate Change as a Global Security Issue. *Journal of Global Security Studies* 1: 95-98.

Holland, Andrew and Albert James DeGarmo. 2014. *Global Security Defense Index on Climate Change*. American Security Project.

Brzoska, Michael. 2009. The Securitization of Climate Change and the Power of Conceptions of Security. *S&F Sicherheit und Frieden* 27(3): 137-145.

9.2 Climate Change and US National Security Policy

Klare, Michael T. 2019. A World Besieged: The Climate Threat to American National Security. In *All Hell Breaking Loose: The Pentagon’s Perspective on Climate Change*, ch. 1. New York: Henry Holt and Company.

US, National Intelligence Council. 2016. Implications for US National Security of Anticipated Climate Change. NIC WP 2016-01. September 21. (10 pp.)

Madeira, John. 2019. Climate Change, Sub-Saharan Africa, and US National Security. *American Security Project*, Aug.

9.3 Climate Change Governance

Victor, David G. 2006. Toward Effective International Cooperation on Climate Change: Numbers, Interests and Institutions. *Global environmental politics* 6(3): 90-103.

Chan, Gabriel, Robert Stavins and Zou Ji. 2018. International Climate Change Policy. *Annual Review of Resource Economics* 10: 335-360.

Mitchell, Ronald B and Charli Carpenter. 2019. Norms for the Earth: Changing the Climate on Climate Change. *Journal of Global Security Studies* 4 (4): 413-429.

9.4 Dealing with Deep Uncertainty

Spiegelhalter, David J. and Hauke Riesch. 2011. Don’t Know, Can’t Know: Embracing Deeper Uncertainties When Analysing Risks. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 369(1956): 4730-4750.

10 Global Health

Global pandemics also constitute threats (often external ones) and global health has emerged as a security issue with attendant governance arrangements. The COVID-9 pandemic is an embodiment of that threat/challenge and is testing global governance.

10.1 Emergence of Global Health

Cooper, Richard N. 1994. International Policy Coordination. *Journal of International Affairs* 48(1): 287-293. Excerpt from pp. 290-291.

Price-Smith, Andrew T. 2002. Infectious Disease and Security. In *The Health of Nations: Infectious Disease, Environmental Change, and Their Effects on National Security and Development*, ch. 4, 117-139. Cambridge, Mass.: MIT Press.

Barrett, Scott. 2007. The Smallpox Eradication Game. *Public Choice* 130 (1/2): 179-207.

Long, William J. 2011. Pandemic Peace? In *Pandemics and Peace: Public Health Cooperation in Zones of Conflict*, ch. 1, 1-17. Washington, DC: US Institute of Peace Press. Read pp. 1-15.

Yamey, Gavin, Osondu Ogbuoji and Kaci Kennedy McDade. 2018. We need a consensus on the definition of global public goods for health. Brookings Institution Blog, November 20.

Peterson, Sue. 2018. Global Health and Security: Reassessing the Links. In *The Oxford Handbook of International Security*, edited by Alexandra Gheciu and William C. Wohlforth. Oxford: Oxford University Press.

10.2 The COVID-19 Pandemic and International Relations

Brown, Theodore M. 2020. The United States and the World Health Organization. Blog, May 29.

Busby, Joshua. 2020. What International Relations Tells Us about COVID-19. E-International Relations, Apr. 26.

Welsh, Jennifer. 2020. Briefing: International Cooperation and the COVID-19 Pandemic. McGill University, Max Bell School of Public Policy, Apr. 1.

van Creveld, Martin. 2020. At Six after the Corona Crisis. Blog post, Apr. 23. <http://www.martin-van-creveld.com/at-six-after-the-corona-crisis/>