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Abstract: This article provides strategy makers with a multiple causation framework for analyses in complex environments with low tolerances for negative outcomes. With this framework, leaders can develop solutions with outcomes surpassing the effectiveness of single causation approaches.

Cause-and-effect relationships lie at the heart of all strategic decision-making. The raison d'etre of strategy is the idea that our choices matter. We make deliberate, strategic choices because we believe what we choose shapes what is to come. All definitions of strategy link present decisions to some desired future condition. Therefore, good strategy depends on the effective identification and manipulation of causal relationships. Whether we want to maintain the status quo or alter a system, we must have a sense of the cause-and-effect relationships that support those conditions.

Causation is the basis for explanation (Why did this thing happen?) and prediction (What is going to happen?). Both are crucial to strategy. Let us therefore make a simple assertion: the better we understand the causal relationships in a system, the better our strategy for manipulating that system will be.

How do we raise our causal IQ? To begin, we must acknowledge we use the word "cause" in regular speech to signify many different things. The phrase "x causes y" is, on its own, pretty uninformative. Take the following examples: Smoking causes cancer. The bacterium *Vibrio cholera* causes cholera. Irresponsible lending practices caused the 2008 financial crisis. And, the missed free throw caused the basketball team to lose the game.

Apart from the shared use of "cause," not much links these statements conceptually—cause means something different in each case.[1] Even the statements describing the causes of disease make very different arguments. One is probabilistic: smoking dramatically increases the risk of developing lung cancer and, in some cases, is sufficient to cause lung cancer. The other argues for a necessary condition: without *Vibrio cholera*, there is no cholera.

Causation, it turns out, is complicated. As the relationship between causes and effects is foundational to strategy-making, we must get better at determining it, yet we rarely teach or study a systematic and persistent approach to learning it. To understand and to exploit causal relationships more effectively, strategic decision makers must take a

1 Judea Pearl, "The Art and Science of Causes and Effect" (lecture, University of California, Los Angeles, October 29, 1996), http://singapore.cs.ucla.edu/LECTURE/lecture_sec3.htm.

pluralistic approach to comprehending causes. Toward this purpose, we present a multiple causation framework (MCF) based on four modes of causal explanation: regularity and probability, counterfactuals, physical processes, and disposition.

This framework will help national security leaders think more holistically and comprehensively about military strategy than the historically narrow view of how and why things happen, the physical view of causation, which will be discussed more later. Yet good strategy is not just the domain of the military. Thus, this framework also has value to leaders developing and implementing strategy than they have historically.

Reasons

Human beings are suckers for good stories, and good stories tend to offer relatively simple narratives. We seek out the narrative that most appeals to us, and we build a simple solution around it. Some of the most contentious arguments about the causes of events are in fact appeals to the primacy of different modes of causal reasoning. When we talk past each other, we are often simply arguing about which causal perspective is most important. Consider the problem of gun crime. The gun control narrative says "no guns, no gun violence," an argument for the necessity of guns in explaining gun violence. The right-to-bear-arms narrative says, "Guns don't kill people, people kill people," an argument for the insufficiency of guns in explaining gun violence and for broader dispositional factors. Logic is on the side of both perspectives. But the insistence that one or the other has a monopoly on truth blinds us to exploring a wider set of alternatives. The plural-cause approach provides an escape from this stalemate.

Employing multiple causal perspectives focuses decision makers on different kinds of questions, levels of analysis, distances in space, and periods of time. Although the framework presented here does not explain the relative power of these causal perspectives, a leader who is open to asking questions based on different causal perspectives has already made significant progress in developing a comprehensive and coherent strategy for manipulating a complex problem. The complexity of the environment will inevitably lead to miscalculations; a multiple causal perspective should significantly reduce these. The multiple causation framework also discourages us from ending the strategy conversation when we discover silver-bullet solutions. Before we describe the framework, however, we must briefly review causal conditions in complex, dynamic (as opposed to static) systems to understand better why a multicausal approach is useful.

Causes

Time is a stream. The effects of yesterday's causes are the causes of tomorrow's effects. Thus, for example, we can explain why the Islamic State came to power, and we can predict what that power is going to do to the region, with and without external intervention. Three categories of causal analysis make such determinations possible. Explanation examines present, by which we mean observable, conditions as the effects of past causes and describes why these outcomes occurred. Prediction documents present conditions as causes and predicts the future

conditions they will produce in an independent system. Intervention analyzes potential changes to the system to predict new, hypothetical conditions useful to attaining strategic aims.

These three activities increase in complexity and difficulty. By no means is explanation in complex systems easy; however, it is easier than prediction and intervention. Moreover, errors in explanation are compounded in prediction and intervention. If we wrongly assess how we got here or even where we are, we will probably be even more wrong about where we are going.

Three additional factors complicate our analysis of causal relationships. Overdetermination prevents us from explaining a specific set of causes that uniquely explain our present condition because there are more than enough past causes for a present effect. Underdetermination limits us from predicting the unique effects that might arise from present causes because we cannot sufficiently restrict future, potential effects. Even when we succeed in explanation and prediction, adaptation acknowledges all causal relationships that involve human choice are provisional: agents in a system have a frustrating tendency to change the rules in the middle of the game.

Identifying the cause of the surrender of Japan in August 1945 is a powerful example of overdetermination. The defeat of the Japanese in Burma, the Soviet declaration of war on Japan and its invasion of Japanese-occupied Manchuria, the atomic bombing of Hiroshima and Nagasaki, the changing power dynamics in the Japanese ruling circle, and the continued blockade of Japan were each a sufficient cause for Japan's surrender. But which were necessary for the outcome?[2] To assign definitive credit for the surrender requires knowledge we cannot obtain.

By contrast, underdetermination precludes precise prediction. With overdetermination we cannot determine what is necessary to obtain our present condition; with underdetermination we cannot know what is sufficient to obtain a future condition. Was the Treaty of Versailles enough to require, a second major European war? No. While the treaty increased long-term instability, it did not necessitate another war. Other factors also mattered.

With the benefit of hindsight, we could easily adopt a world-on-rails view of history in which each event is uniquely determined by the events that precede it and one thing necessarily and unavoidably follows the other. Yet we are skeptical that we can predict the future with precision if we just have enough data and computing power.[3] The future always divides before us. Every decision forecloses some potential futures, but also opens new possibilities. In military planning, this reality is reflected in the branches and sequels of plans. From our present causes, we can construct numerous possible future states. Improbability and impossibility should not be confused.

The essential concepts of necessity and sufficiency are also at work. If X is necessary for Y, Y cannot occur without X but X alone is not enough to cause Y. Oxygen is necessary for fire but not sufficient to

2 For a balanced discussion of this question, see Richard B. Frank, *Downfall: the End of the Imperial Japanese Empire* (New York: Random House, 1999).

3 Pierre Simon Laplace, *A Philosophical Essay on Probabilities*, trans. Frederick W. Truscott, Frederick L. Emory, and E. T. Bell (New York: Dover, 1951).

start a fire—fuel and heat are also necessary. If X is sufficient for Y, it means X alone could produce Y. However, when we exclusively argue for the sufficiency of a single cause, we leave open the possibility that other causes could yield the same effect. A massive electrical shock is sufficient to cause death but not necessary for death to occur. If X is necessary and sufficient to cause Y—there is no other way to produce Y—then Y is uniquely caused by X alone. These distinctions may seem clear enough, but confusion about the difference between necessity and sufficiency contributes to bad policy and poor strategy.

Modes

Given the challenges of overdetermination and underdetermination, and the distinction between necessity and sufficiency in causes, we can improve strategy development and execution through a wide view of causation. A plural-cause perspective embraces the many ways for understanding why things happen.[4] Strategic leaders can identify current and potential causal connections while developing strategies by using a framework based upon four modes of causal explanation—regularity and probability, counterfactuals, physicalism, and disposition—that outlines tools for discovering and for exploiting these connections.

Regularity and Probability: Patterns, Patterns Everywhere

The regularity-and-probability view (RPV) of causation identifies causes in consistent patterns observed through experience—for example, low air pressure always (or usually) precedes rain; therefore, low air pressure is the cause of rain. In its purest form, this account of causation simply identifies an association between two facts. Pattern recognition, especially of highly consistent relationships, is the foundation for much of our learning—fire produces heat, heat causes pain; therefore, do not touch fire. Thus, we use the regularity-and-probability view all the time.

Not all regular relationships are deterministic: some causes usually, but not always, precede certain effects. Yet these probabilistic statistical relationships are the basis of many important causal insights, and statistical modeling has become the primary method for using probability to identify and corroborate causal relationships in medicine, epidemiology, and many of the social sciences.[5] In this probabilistic form, RPV tends to identify potentially sufficient but not necessary causes. For instance, observing a connection between a breakdown in basic government services and an increased tendency toward insurgency in Baghdad, we can claim the breakdown was sufficient but not necessary for insurgent activity.[6]

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4 This framework draws on the plural-cause perspective advanced by the philosopher Peter Godfrey-Smith. Peter Godfrey-Smith, "Causal Pluralism," in *Oxford Handbook of Causation*, eds. Helen Beebee, Christopher Hitchcock, and Peter Menzies (Oxford: Oxford University Press, 2009), 326–37; and Stephen Mumford and Rani Lill Anjum, *Causation: a Very Short Introduction* (Oxford: Oxford University Press, 2013).

5 Judea Pearl, "Causal Inference in Statistics: An Overview," *Statistics Surveys* 3 (2009): 96–146, doi:10.1214/09-SS057; and Christopher Winship and Michael Sobel, "Causal Inference in Sociological Studies," in *Handbook of Data Analysis*, ed. Melissa A. Hardy and Alan Bryman (London: Sage, 2004), 481–503.

6 Major General Peter W. Chiarelli and Major Patrick R. Michaelis, "Winning the Peace: The Requirement for Full-Spectrum Operations," *Military Review* 85, no. 4 (2005): 9–11.

Valuable in causal analysis, RPV is useful for developing indicators and predictors, for conducting preliminary program evaluation, and for developing hypotheses about underlying causal mechanisms.[7] With observational data and computing power getting cheaper all the time, RPV is also economical and fast. If we have representative data that is free of sampling errors, we can run models at relatively low cost.[8]

Another strength, which is also one of the drawbacks, of RPV is the ability to develop useful predictors and indicators despite their insufficiency for interpreting the probabilistic associations that we observe.[9] Many associations between variables are in fact spurious, which means we observe a strong correlation that is due to chance, such as a sports fan noting the connection between wearing a certain T-shirt and his favorite team's performance. On its own, RPV does not give us the conceptual tools to distinguish between authentic, lurking, and spurious connections and is therefore insufficient to develop policy and strategy interventions. Nor can RPV be used to prove necessary connections between causes and effects; it can only suggest sufficient causal connections. The evidence provided by such models remains circumstantial.[10]

A second problem with RPV is its reliance on experience: it has no element of foresight and is the slowest of all the causal perspectives to adapt to new facts. In philosophical terms, this issue is the problem of induction formulated by David Hume in his *Treatise of Human Nature*.[11] Experience is usually a good predictor of future observation, but when it is not, it can be profoundly and catastrophically misleading. This Black Swan problem is especially relevant to strategic systems in which participants adapt. Such adaptations may disrupt relationships that up to that point had the qualities of laws of nature.[12] Traditional statistical models are slow to adjust to such changes in behavior as demonstrated during the 2007–8 financial crisis when Americans began defaulting on their mortgages in record numbers.[13] Nevertheless, RPV is a great starting point for causal analysis.

Counterfactuals: "If not for . . ."

The counterfactual lens sees causes as difference-making events. If we removed some contributing cause from the system, would the system of transmission collapse? Whereas RPV identifies causes through their constant (or probabilistic) conjunction with effects, counterfactual causal reasoning is completely focused on necessary (or dependent) connections between causes and their effects. We identify counterfactual causes in three ways: physical experimentation, statistical analysis, and

7 Jim Manzi, *Uncontrolled: The Surprising Payoff of Trial-and-Error for Business, Politics, and Society* (New York: Basic Books, 2012), 155–56.

8 Charles J. Wheelan, *Naked Statistics: Stripping the Dread from the Data* (New York: Norton, 2013), 111–26.

9 Stathis Psillos, "Regularity Theories," in *Oxford Handbook of Causation*, 131.

10 Wheelan, *Naked Statistics*, 224; Williamson, "Probabilistic Theories," in *Oxford Handbook of Causation*, 203; Clark Glymour, "Causation and Statistical Inference," in *Oxford Handbook of Causation*, 510; and Manzi, *Uncontrolled*.

11 David Hume, *Treatise of Human Nature*, ed. L. A. Selby-Bigge (London: Henry Frowde, 1888), 89.

12 Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable*, 2nd ed. (London: Allen Lane, 2011).

13 Harold Kincaid, "Causation in the Social Sciences," in *Oxford Handbook of Causation*, 738.

thought experiments.[14] The first two are empirically based. The third is purely deductive.

Intelligently applied, experimental approaches provide leaders with timely information about causal assumptions and give leaders a mechanism for examining new ideas without committing the whole organization to them. Leaders should embrace experimentation as a core element of strategy development and change.[15] Experiments in which subjects are randomly assigned to an experiment group and a controlled group are the gold standard for assessing causality.[16] When experimentation is not possible, sophisticated statistical tools can be used to interpret nonexperimental, observational data in a way that explains what might have happened in the sample if an experiment had been conducted.[17]

Thought experiments are perhaps the most familiar mode of counterfactual causal reasoning. They allow us to examine causal relationships in light of hypothetical absences—what would have happened had this thing not happened. Many important causal arguments are completely outside of the realm of formal experimentation or statistical analysis. Barbara Tuchman's *The Guns of August* is a riveting account of the outbreak of World War I that relies on a series of counterfactual questions to explore the causes of the war and its devolution into a catastrophic stalemate. If Archduke Franz Ferdinand had not been assassinated in Sarajevo . . . if the German offensive had not been delayed by the Belgian fortifications . . . if the French had not held at the Marne . . . [18] Thought experiments suggest the necessary causes of events, though they can never be conclusive.

Counterfactual causal reasoning, however, does have limitations. First, counterfactuals are great for identifying necessary causes, but those are not always the ones that matter. Necessity alone is not enough to identify key leverage points in strategy formulation. "If there were no people in country X there would be no rebellion," is certainly a true statement, but it is not useful unless we are willing to consider depopulation as a strategy—which we are not. "There are people" is a necessary condition for rebellion, but it is not sufficient.

Second, the list of counterfactuals can be very long. We can assert that without the terrorist attacks on September 11, 2001. . . or if Osama bin Laden had not been born. . . or if George W. Bush had not been elected. . . or if the British had not arbitrarily divided the Middle East following the collapse of the Ottoman Empire. . . there would have been no Iraq War. And so, discussions regarding necessary conditions should be leavened with good judgment about which causes should correspond to actual policy decisions.

Finally, counterfactuals raise the problem of preemption. In order to identify X as a necessary cause of Y, we must assume another necessary

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14 L. A. Paul, "Counterfactual Theories," *Oxford Handbook of Causation*, 159. See also Winship and Sobel, "Causal Inference in Sociological Studies," 481–503.

15 Manzi, *Uncontrolled*, 70–82, 86.

16 Seth Stephens-Davidowitz, *Everybody Lies: Big Data, New Data, and What the Internet Can Tell Us about Who We Really Are* (New York: Harper Collins, 2017), 209.

17 Winship and Sobel, "Causal Inference in Sociological Studies," 493–95.

18 Barbara W. Tuchman, *The Guns of August* (New York: Macmillan, 1962).

cause would not have occurred if X were removed. This assumption may not be justified. If I am late for work because I was stopped for speeding, the stop is a difference maker. But suppose that because I was stopped, I avoided getting in an accident due to my speeding, which also would have made me late—one necessary cause of being late preempted another. Suppose the 9/11 operation had been prevented by law enforcement. Would the United States never have invaded Afghanistan to confront al-Qaeda?

In this context, we can see counterfactual causes are more effective based upon their proximity in time and space to the effects they seek to explain. Counterfactual causation involves thinking about causal processes, but it is similar to RPV in that it suffers from an absence of tools for identifying causal mechanisms.

Physicalism: Inside the Black Box of Causation

Physicalism focuses on causes as direct links to effects in a process and seeks to understand the mechanism that links them. When determining the causes of IED attacks, physicalism would draw attention to the process of fabricating, placing, and triggering the explosive device. This perspective helps identify points that would allow us to disrupt the process. Equipping vehicles with the technology to jam a cellular signal transmitted by a triggerman to an emplaced IED is an example of an intervention prompted by a physical perspective.

Of all of the causal perspectives, physicalism is perhaps the most military in its outlook. This view orients strategists to elements of a system that are either obstacles to or enablers of success. To stop the drug trade, intercept the shipments. To end an insurgency, kill the insurgents. The notion of centers of gravity is best captured by the physical causal lens. Thus, the military finds this strategic philosophy quite familiar.

In this lens, the underlying causal mechanisms are found through reductive analysis. When we break a system down into some subset of actors or subsystems and the connections between them, we are applying the physical perspective of causation. Through the physical lens, we see causes as literally connected to their effects. Such causes are relatively easy to understand and interventions to address them are often obvious.

Yet physicalism, too, has significant limitations. First, the causal relationships suggested by the physical perspective are highly susceptible to the law of unintended consequences. Physicalism suggests interventions that are very close to the causal interface in space and time, and it encourages a narrowing of focus that may exclude the analysis of interventions' probable side effects elsewhere in the system. Indeed, physicalism is not very useful for exploring those potential effects because it usually lacks a Gestalt perspective on the system as a whole. The reduction of the system to a subset of causal interfaces can obscure the higher-level characteristics of the system. Thus, we miss the forest for the trees or kill the sniper by bombing the mosque.

Second, physicalism emphasizes powerful, silver-bullet interventions that draw attention and resources away from existing, complementary approaches.[19] One of the problems with powerful interventions,

19 Malcolm Gladwell, "The Mosquito Killer," *New Yorker*, July 2, 2001.

and the notion of a center of gravity in a strategic system, is that they give rise to the expectation that strategies can be transformative if only we find the right approach.[20] On its own, physicalism can deceive us into believing in a form of technological solutionism of the type that has plagued American foreign policy for decades.

Third, the physical perspective cannot account for the causal significance of absences. Some things happen because of what is not present. An eighteenth-century naval physician treating a sailor suffering from scurvy might have attributed the man's suffering to food poisoning or an exotic insect bite, when in fact the potentially fatal disease was caused by the absence of vitamin C. No process diagram would reveal this.

Finally, physicalism is poorly suited to recognizing causation due to emergent phenomena in a system. Macrolevel system behaviors such as financial panics or mass protests defy effective analysis through reduction. Such occurrences are more than the sum of their parts and are incomprehensible unless they are observed at the system level.[21]

But as part of a set of causal lenses, physicalism is vital. This perspective reduces complex, adaptive systems into a set of constituent parts and the connections between them, and then invites us to disrupt, change, or enable system behavior by manipulating the system's composition and structure. This lens is a powerful way to comprehend the close, causal interface and intervene in the causal dynamics of a system.

Disposition: Hidden Causes

Disposition, on the other hand, looks at causation from a distance, examining how causes can be drawn into effects. This perspective views causes in traits, characteristics, capacities, or vulnerabilities of an entity that are triggered by context. The cause of the massive forest fire, for example, was the dryness of the forest. Or in the case of the Ebola outbreak of 2014–15, the cause of the epidemic was the lack of effective public healthcare in western Africa.

Disposition describes the relationships between causes and their effects, referring to the power of entities to produce effects. "With powers waiting to be released or stimulated into action," philosopher Stephen Mumford writes, "each event that occurs can be regarded as an effect of a power manifesting itself in a causal process."[22] As a rule of thumb, as we move further away from effects in space in time, our arguments for causation are more likely to be dispositional.

Suppose we question the cause of a civil war in country X. If our explanation cites the nation's ethnic, religious, and linguistic diversity, or the unequal allocation of wealth and power, then we are employing a dispositional causal argument. Most dispositional causes are discovered through a process of inference that is based on both experience (empirical

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20 Headquarters, US Department of the Army (HQDA), *The Operations Process*, Army Doctrinal Reference Publication 5-0 (Washington, DC: HQDA, 2012); and Antulio J. Echevarria II, "Clausewitz's Center of Gravity: It's *Not* What We Thought," *Naval War College Review* 56, no. 1 (Winter 2003): 108.

21 Jeffrey Goldstein, "Emergence as a Construct: History and Issues," *Emergence* 1, no. 1 (1999): 50, doi: 10.1207/s15327000em0101_4. According to Goldstein, "Emergents have features that are not previously observed in the complex system under observation. . . [They] are neither predictable nor deducible from lower or micro-level components."

22 Stephen Mumford, "Causal Powers and Capacities," *Oxford Handbook of Causation*, 272–3.

observation) and abstract reasoning. Dispositional arguments usually have to employ a theory to justify the explanation. Dispositional insight therefore requires a combination of observation and creativity.

Because dispositions, such as personality and culture, in social systems are often not observable, causal arguments that employ them involve inference, as well. No other causal lens allows us to think about the causes of things before they have happened. If we want to understand what causes a nuclear war, we probably do not want to build an argument based on experience or experimentation. We will reason based on abstracts and analogies. Similarly, the dispositional view helps us think about the causes of nonevents. When we want to understand why something did not happen, the dispositional lens leads us to examine how the absence or presence of something may have prevented an effect.

As with other causal perspectives, the strength of dispositional causal explanation is also its weakness. First, because disposition lets many causal explanations in, we can spend too much time arguing about the causes of things that have never happened. Second, the emphasis on unobservable causes introduces problems with specification—for example, personality may be the cause of many behaviors, but experts spend a lot of time arguing about its definition.

Disposition is nevertheless an essential causal perspective and a powerful tool for understanding why things happen. With unique strengths, this lens is ideally applied in combination with other modes that will counteract the tendency of dispositional arguments to become too inclusive or too diffused.

Application

The right questions are more valuable than the wrong explanations. More than anything, this framework suggests a set of questions that leaders can use to identify the various causal relationships in complex systems and to develop a portfolio of interventions toward a desired condition.

- Regularity and probability. What elements are regularly observed close to an outcome in space or time?
- Counterfactuals. Which elements could be removed from the system to preclude an outcome or enable alternate outcomes?
- Physicalism. Which key set of elements can be most closely connected to where, when, and how major events happen?
- Disposition. What are the active and latent, individual and collective tendencies that enable or inhibit the outcome that we wish to produce or avoid?
- Intervention. To what extent are any of the identified causal relationships subject to manipulation?
- Intervention. What is the probability and consequence of miscalculation?

The final two questions consider the importance of limiting errors when developing strategies in complex environments where miscalculation is not a possibility but a certainty. The Nobel Laureate Herbert A. Simon coined "bounded rationality" to describe how the complexity of most organizational environments limited the ability of

managers to make economically optimal decisions. Simon also listed three constraints on optimization in decision-making: We cannot know the precise consequences of our decisions, which is essentially an argument for the underdetermination of effects. We cannot know the true value of the things we seek—for example, we imperfectly anticipate how we will feel about an effect. And we cannot exhaustively specify causes, that is, there are always causes that we do not know or imagine.[23]

Illustration

In 2014, the worst Ebola outbreak on record afflicted the West African nations of Guinea, Sierra Leone, and Liberia. In response to the unprecedented levels of infection, the United Nations established the first emergency health mission, the UN Mission for Ebola Emergency Response (UNMEER). Anthony Banbury, then-head of UNMEER, determined the first task was to develop a unifying strategy for the various UN agencies and international partners that were providing assistance. At a conference in October, UNMEER and its partners decided upon a strategy based on four core activities.

The first—case management—focused on treating the sick and isolating patients during recovery. The second—case finding and lab and contact tracing—concentrated on finding those who might be ill and cutting chains of infection as quickly as possible. The third—safe and dignified burials—centered on preventing Ebola transmission from the fluids of corpses. The fourth and final activity—community and social mobilization—educated on community identification, isolation, and treatment of the sick to prevent further transmission of the disease.[24]

The unifying objective of the strategy was to stop Ebola from causing people to die. Interrupting this causal relationship was the change that UNMEER wished to bring about in the affected nations, and all four pillars of the strategy supported that change. But each activity dealt with the causal connection between Ebola and death in a different way, and to some extent, each represented a different perspective on the statement, "Ebola causes death." Yet each line of effort in the international response exemplified at least one of the four causal lenses.

Case management/RPV and physicalism. Case management sought to reduce the probability of death after contracting the disease. This strategy involved recognizing patterns of the illness and understanding the physical damage the virus caused. Doctors reviewed patient records to determine which treatments significantly decreased the mortality rate. From this basic understanding of the mechanism of the disease, death from rapid dehydration, physicians suggested using certain interventions over others and prioritized interventions during specific stages of infection. Thus, the strategy of increasing Ebola patients' fluid intake early in the treatment counteracted the struggle to maintain hydration during the advanced stages of the disease and yielded positive results.

Case finding and lab and contact tracing/RPV and counterfactuals. Case finding focused on locating the sick by using public health

23 Herbert A. Simon, *Administrative Behavior: A Study of Decision-Making Process in Administrative Organization*, 4th ed. (New York, Free Press, 1997), 93–94.

24 "UN Mission for Ebola Emergency Response," UN Ebola Response, accessed August 2, 2015, http://ebolaresponse.un.org/un-mission-ebola-emergency-response-unmeer.

data, surveilling affected communities, and identifying patterns that would increase the probability of locating infected people who were not yet known to the health system. Lab and contact tracing was built around the idea that infectious diseases spread to uninfected people from an infected person. "If someone does not have contact with the infected, that person will not die of the disease," is a simple and persuasive example of counterfactual causal thinking.

Safe and dignified burials/Physicalism. Safe and dignified burials focused on allowing cultural customs and practices to be performed while mitigating the risk of infection by physical causes—the biological mechanism of virus transmission and the funeral and burial practices. In many cultures of the affected nations, religious customs require the dead be washed and prepared for burial, and the bereaved grieve in close contact with the corpse. When the dead person is a victim of Ebola, those who come in contact with the body are at significant risk of infection. But simply ignoring these customs would deprive family members of their opportunity to grieve, which might lead people to avoid notifying health authorities of a dying person and spread the disease. Safe and dignified burials controlled the postmortem release of bodily fluids, incorporated personal protective equipment during the rites, and practiced sanitation guidelines to prevent infected fluids from being released into the environment.

Community and social mobilization/Disposition. Community and social mobilization focused on reducing communities' vulnerability to acquiring and spreading the disease regardless of its presence in the population. A major contributor to the rapid spread of Ebola was the absence of trust in public institutions in the affected countries. In many cases, instead of contacting public health officials when a member of the community showed symptoms of disease, community members would conceal the sick from containment teams or move ill people out of the area, which lengthened the trail of infection. The cultural burial practices also disposed communities to spreading the virus. Thus, social and cultural characteristics acted like dry fuel in a forest, providing material through which a fire could spread. Community and social mobilization sought to change this by educating the public regarding the proper procedures for isolating and treating the sick and safely handling the body if a patient died.

The Ebola example demonstrates that an essential part of developing an effective, multicausal strategy is being open to identifying a wide variety and combination of potential causal relationships. This objectivity can be hard to practice. Politically or culturally sensitive perspectives may be held in abeyance in fear of offending key stakeholders. It makes no sense to examine causal relationships explicitly, only to skip a central relationship because it makes people uncomfortable.

The discussion on improving American student performance provides an example of this imprudence. Policymakers examine socioeconomic and operational factors such as neglect, classroom size, teacher quality, unions, parental involvement, and the number of books in the home. Decades of education policies have spent billions of dollars on various interventions, with little or no improvement in student outcomes. Why have we not made progress? Perhaps because we are ignoring the best predictors of student academic achievement, intelligence (as

measured in IQ), which is best predicted not by environmental factors but by parental IQ. The heritability of IQ is a major dispositional cause of educational performance.[25] Due to a legacy of association with repugnant theories of racial superiority, however, this characteristic is rarely considered when setting the performance goals that must inform wise education policy.

These same kinds of omissions occur when discussing dispositional factors in places like Afghanistan. How does culture affect politics? What is the tendency of this society, given these circumstances? In order to develop and implement effective strategies and policies, we must speak truth to power across the range of the four lenses described in this paper. Leaders are responsible for creating and maintaining an environment that enables an open exploration of options.

Conclusion

A plural view of causation opens our minds to the wider possibilities of behavior. When we consider multiple types of causation, we see causes in the system from multiple levels and from multiple distances in space and time. A pluralistic view of causation helps us to see how multiple interventions may be necessary to maintain or to change system conditions. Such a view also helps us recognize the unintended consequences of interventions—for example, viewed from a physical perspective, violent action against an insurgency may be extremely appealing. Insurgents are agents of violence, and if we destroy these agents, we interrupt the production of violence in the system.

But what does this intervention look like from a dispositional standpoint? How does an insurgent-killing strategy affect the tendency of the system to produce more insurgents? When we kill insurgents, we may gain the favor of the part of society that is sympathetic to US interests or to the government that we support. But we may also radicalize the opposition or empower those who favor greater violence instead of a political settlement. Indeed, just this sort of polarization has been a common characteristic of many counterinsurgency campaigns, and was vividly depicted in the film *The Battle of Algiers*.[26]

We are not naive about the effects of violence. Sometimes it works. But forewarned is forearmed, and a leader who is informed about the possible side effects of an intervention is better able to weigh the costs and benefits of that action and to develop mitigating actions.

There is a Yiddish proverb, "Mann traoch, Gott lauch," Man plans, God laughs. We have to analyze and plan because we reject the idea that we are powerless to change our environment. But we also must remain open to the possibility that we may be (sometimes catastrophically) wrong. Understanding and effectively manipulating causation in policy and strategy requires that we tread a narrow path between hubris and fatalism. Perhaps that is the most important causal insight of all.

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25 Richard J. Haier, *The Neuroscience of Intelligence* (New York: Cambridge University Press, 2017), 195–96; and Kathryn Asbury and Robert Plomin, *G is for Genes: The Impact of Genetics on Education and Achievement* (West Sussex: John Wiley and Sons, 2014), 142.

26 Franco Solinas, *The Battle of Algiers*, directed by Gillo Pontecorvo (Igor Film and Casbah Film, 1966), 121 min.

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