Clausewitz, Nonlinearity, and the Importance of Imagery

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One reason for historians to play a role in national security affairs is that the narrative understanding of the past offers a reservoir of experience upon which to draw. This is, of course, common practice and common sense. In an era of significant transition such as the post-Cold War period in which we live, most people rely on their sense of the past to orient themselves and gain a feel for the direction of developments.

Many respected commentators argue that today we are on the cusp of the demise of the nation-state as the primary actor on the global political stage. The rival actors, according to Carl Builder and many others, function at both larger and smaller scales of organization.[1] The European cliché says that authority is leaking from the nation-state at both the top and bottom: the supra-national structure of the European Union vies with sub-national levels of government and cross-national regions for the allegiance and energies of leaders and populations. On a global scale, national boundaries are overspread by multinational corporations, transnational criminal organizations, non-governmental organizations and religious authorities and sects. Meanwhile, ethnic groups, local organizations and neighborhoods carve out increasingly defiant enclaves.

It seems to me, however, that entities at both larger and smaller geographical scales will continue to have need of the nation-state, even as the number of perceived "nations" and constituted "states" multiplies. Some actors will want to retain it as a shield behind which to conduct their activities. Others will depend upon it as a base of operations or as a source of resources upon which they will prey. Still others will need it as a convenient target of their rhetoric in order to galvanize action among their followers. And some states with no national constituency and some nations with no state at their disposal will continue to avail themselves of the symbols and practices of nation-states for decades to come in order to legitimate their claims to existence. Prior to the demise of the nation-state those that exist are likely to fragment and multiply, while maintaining the trappings of authority in an increasingly complex "inter-national" arena. During this transition period, nearly as harrowing as the nuclear proliferation we are facing is the national proliferation that will accompany it. Then will come the post-nation-state era.

Part of the historian's function is to explore the long-term view of the past in an effort to minimize temporal myopia. The nation-state is not likely to last forever—nothing really does, because entities either adapt to change and thus at some point become significantly different from their earlier incarnations, or they fail to adapt and disappear (with or without trace). But the nation-state is also not likely to evaporate in the next congressional budget cycle. After all, its demise or "withering away" has been projected by one observer or another from the mid-nineteenth century onward. It will still be around for a while.

Clausewitz as Theorist of the Nation-state and of War

The modern state has its roots in the secularizing tendencies of the late Renaissance and the onset of early modern warfare in the seventeenth century. The modern nation-state came to prominence with the French Revolution in the 1790's. Although not usually portrayed as such, an important theorist of this form of government was Carl von Clausewitz, who understood the energy unleashed in the emotional calls to arms of large portions of the male citizenry in Europe during the Revolutionary and Napoleonic eras.[2]

Clausewitz realized that the radical transformation of the scale and nature of war in his lifetime was due to a deeper phenomenon. This was the new participation of the citizenry as a whole in politics, a participation that characterized the transition from the modern state to the modern nation-state. Broadened political participation was at the heart of the French Revolution, Napoleon's successes, and also—ultimately—the measures adopted by Napoleon's opponents in order to defeat the French. Clausewitz understood political participation as stimulus for, exercise of, and constraint upon power. He knew that neither the Revolution nor the reforms created to combat it could be rolled back for long, because, as he wrote in his manuscript On War, "...once barriers—which in a sense consist only in man's ignorance of what is possible—are torn down, they are not so easily set up again."[3]

Thus the devolution of power—the democratic, egalitarian or fragmenting trends we have heard so much about at this conference—are related to the development of the nation-state itself and the continuation of broad trends that created the context for all Clausewitz's attention to the phenomena in and of war.

Clausewitz was also a theorist of war, which he perceived as a nonlinear phenomenon.[4] In order to discuss his views let us start where he does, as a good theorist, with definitions. In his work On War, Clausewitz first says that war is a "duel." This usually generates the image of two independent opponents crossing swords with one another or firing pistols at twenty paces. Actually this is too discrete and linear an understanding. The word which is usually translated as duel is Zweikampf, which literally means "two-struggle." The image Clausewitz himself offers on the same page is in contrast quite nonlinear: two wrestlers struggling with one another. The (presumably Greco-Roman and not WWF) wrestlers interact, generating positions and shapes that neither could possibly create alone.

Clausewitz also holds that war is the "continuation of policy" by other means. The conventional approach to this definition envisions a compartmentalization of politics (Politik, which also connotes policies) and war in a linear sequence—first comes politics/policies, then war, then politics/policies again to make and maintain peace. Furthermore, these interpretations hold that Politik drives war, but not vice versa. Actually the German word we translate as "continuation" (Fortsetzung) means literally a "setting-forth." This term does not require a sense of leaving something behind in the process; only our linear preconceptions lead us to imagine a norm in which the conduct of war is insulated from its context. A different approach emphasizes that Clausewitz believes war is not linear: war is a subset of the political context, and, furthermore, politics and military action interact in a complex, continual feedback process. As is the act of going to war in the first place, every act in war is the "setting forth" of politics/policies.

Furthermore, the conduct of any war affects its character. How else could Clausewitz have conceived the relationship between war and Politik, given his understanding of the new relationships created by the nation-state? New tactics and technologies affect the way a war is fought. But consider also the ways in which the Prussian state was forced to undertake deep political and social reform in order to respond to the changed demands of the battlefields of the time, and the ways in which those reforms affected the structure and combat characteristics of the Prussian armies in the field. Experience told Clausewitz that the conduct of war affects its political context, which responds with changed parameters and goals that alter the conduct of war, which affects the political context anew, and so forth.

Finally, Clausewitz claims that war is a "remarkable trinity" composed of the primordial passions of the people, the rational policies of the state, and the combination of incidents in battle (good luck or bad luck, the genius of the army commander, accidents with great consequence, etc.). Theory, he says, should be treated as if it were an object suspended among these three points of attraction.

Many commentators have taken Clausewitz to mean that war should be treated in linear fashion in the form of a triangle, with lines bisecting each angle to create a static intersection point at which theory resides. But actually, the word translated as "suspended" (schwebend) connotes a hovering or a floating about. The physics demonstration of a pendulum tracing out a highly complex and irreproducible trajectory among three magnets is exactly what Clausewitz had in mind. And it is the quintessential demonstration of a nonlinear system highly sensitive to the initial conditions under which it operates.

Every war involves inherent nonlinearities that pose problems for prediction, and Clausewitz talks about three broad categories of nonlinear factors that make for unpredictability in war. The first is interaction between animate entities that act, react and even preempt. This is not a simple binary opposition, for to Clausewitz much of what matters takes place in the spaces between and around the interacting entities (hence the image of the wrestlers or magnetic fields). His attention is always drawn to where boundaries are complex rather than simple.

The second source of unpredictability is what Clausewitz chooses to label "friction." We must keep in mind that this was a term taken from the research forefront of his own day, a high-tech notion from the emerging science of thermodynamics. Clausewitz had in mind that wars are dissipative systems, which in the real world (as opposed to that of pure theory) always suck in and consume people and other limited resources. In another sense he meant with this term the amplification of a microcause to a macro-consequence, in a kind of cascade of things gone wrong. This is his more interesting version of the adage that "for want of a nail the shoe was lost, for want of a shoe, ..."[5]

Clausewitz also regards chance as one of the sources of unpredictability in war. He nowhere offers a concise definition of chance, but it seems to me that he addresses three forms of chance in On War. The first is stochastic phenomena, because Clausewitz repeatedly emphasizes that there are no firm boundaries that isolate war from its political context. Another is the amplification of undetectable microcauses, which ties chance and friction together in the inevitable confusion of war. And a third is the set of analytical blinders we unavoidably wear in real life, blinders that make us slice up the universe in manageable pieces and then perceive as chance the intersections of some of those slices.

None of this means that linearity cannot ever be achieved in war, but it does indicate that linear, predictable relationships are hard to come by. They are also always attained at some significant cost. More importantly, our search for and reliance upon proportional and additive relationships creates a set of those analytical blinders that constitutes a potential weakness available to our opponents. The purpose of any theory of war for Clausewitz is to explore the entire range of possibilities, including counterfactuals in the sense that physicists understand them. It is not to generate a preconceived set of stable relationships, a checklist of laws valid upon any occasion, "since no prescriptive formulation universal enough to deserve the name of law can be applied to the constant change and diversity of the phenomena of war."[6] Instead, theory should be guided by knowledge of past human experience and the best current scientific understanding of reality and natural constraints. According to Clausewitz, history must inform theory and serve to educate the commander. Only in this way can the nonlinear nature of war be understood adequately. This is the import of the images Clausewitz uses so astutely.

About Nonlinearity and Imagery

Why harp on nonlinearity, much less imagery? Why do they matter? Let us start with nonlinearity.

One reason for emphasizing nonlinearity is that it constitutes the well-established mathematical property underlying and making coherent all the faddish-sounding new sciences: deterministic

chaos, fractals, self-organizing systems far from thermodynamic equilibrium, complexity and complex adaptive systems, self-organizing criticality, cellular automata, solitons, and so forth. It was in various ways sensed by the ancient Greeks. Newton understood it, although the great French mathematicians of the eighteenth century linearized Newton as they popularized his ideas—much of what we decry as "Newtonian thinking" would actually be better ascribed to Laplace. Clausewitz recognized its importance as an alternative to Laplacian precepts, perhaps because he had such great antipathy toward those things that were French. Yet no one before the late twentieth century could solve the interesting problems posed by many nonlinear equations. There are no analytical techniques that work well, and numerical methods were just too cumbersome and time-consuming. Most scientists just bracketed out the nonlinear elements of their equations and went with the idealized linear approximation. Now computers allow us to go after formerly intractable problems by pursuing numerical solutions.[7]

The connotations of linearity still drive a great deal of our thinking, especially in mechanics and the many social scientific disciplines that implicitly try to copy the success of mechanics. Linearity offers structural stability and emphasis on equilibrium. It legitimates simple extrapolations of known developments, scaling and compartmentalization. It promises prediction and thus control—very powerful attractions indeed. But linear systems are often restrictive, narrow and brittle. They are seldom very adaptive under significant changes in their environment (as Clausewitz clearly understood). Bureaucracy is the quintessential linearization technique in social affairs.

The connotations of nonlinearity comprise a mix of threat and opportunity. Nonlinearity can generate instabilities, discontinuities, synergisms and unpredictability. But it also places a premium on flexibility, adaptability, dynamic change, innovation, and responsiveness. This is why there seems to be serious metaphorical value in the images and ideas emanating from the new sciences.

Murray Gell-Mann, James Rosenau, and others caution wisely against expecting too much, too soon from the new sciences and stress the informed use of metaphor for now. I could not agree more. But if this sentiment implies that metaphors are merely poor substitutes for adequate models, then I could not disagree more. Metaphors are extremely powerful in their own right and should not be treated simply as tokens along a tollway toward models.

What is metaphor? Is it only a stylistic flourish, as most of us think who encountered metaphors primarily in literature classes in school? No, metaphor is much more significant, as philosophers and linguists are beginning to demonstrate more and more convincingly.

A metaphor is usually a statement that is paradoxical. It is literally false according to the rules of abstract rationality (i.e., logic, truth tables), but is true according to the rules of imaginative rationality (i.e., art). Metaphor constitutes a ubiquitous, irreducibly complex aspect of any natural language. It is an essential "AS" gate in our cognitive processing. It is a crucial way we understand one thing as another.

Metaphors are embedded throughout our speech patterns (including the word "embedded" here). They are jarring when new, but often we use "dead" metaphors or clichés such as the wings of a building, the branches of science, weighing our options, or sitting at the foot of a mountain. Each such "gate" is much more than a word. Contemporary researchers tell us that metaphors are indicators of networks of meanings and entailments that dilate or constrain both our perceptions and our conceptions.[8] It is furthermore possible to extend this understanding to visual and other metaphors such as the Mandelbrot set that enlivens our program cover at this conference.

The importance of metaphor has long been understood. Aristotle wrote, "The greatest thing, by far, is to be a master of metaphor. It is the one thing that cannot be learned; and it is also a sign of

genius." He contended that it is so indicative of power that is it not appropriate for slaves to use it. Hobbes took a related but different tack. For him, metaphors were dangerous not due to their power, but their tendency to confuse us as "senseless and ambiguous words." He distrusted reasoning with metaphors as "wandering amongst innumerable absurdities." But this was the same Hobbes who also wrote: "Why may we not say that all Automata...have and artificial life? For what is the Heart, but a Spring; and the Nerves, but so many Strings; and the Joynts, but so many Wheels..."[9]

This is quite arresting and interesting. It could be mere sloppiness on the part of Hobbes, but in the writing of so powerful a thinker something else may be at work. That something is also displayed in the words of Clausewitz. Critical studies, he says, are imperiled by narrow systems used as formal bodies of law and "a far more serious menace," the "retinue of jargon, technicalities and metaphors that attends these systems. They swarm everywhere—a lawless rabble of camp followers."[10]

To condemn metaphors in such a colorfully metaphorical way implies that Clausewitz thought—as did Hobbes—in profoundly metaphorical terms. Think merely of his "friction," or "fog" of war, or "center of gravity." Recall how a defeat "leaves a vacuum that is filled by a corrosively expanding fear which completes the paralysis. It is as if the electric charge of the main battle had sparked a shock to the whole nervous system of one of the contestants." Or how routine constitutes a clock "pendulum" that reduces natural friction and "regulates" the mechanism of war. Or how war has its "own grammar," but not its own logic. Or that politics is "the womb in which war develops—where its outlines already exist in their hidden rudimentary form, like the characteristics of living creatures in their embryos."[11]

Why did Clausewitz resort to this "lawless rabble of camp followers" in his own language? One reason was that he wanted to draw upon history to generate theory. In historical studies a major goal is frequently to understand one thing (the present or a vision of the future) in terms of another (the past). Metaphor is very robust for this purpose. Consider the staying power of the metaphor of the 1938 Munich agreement in American foreign policy since World War II. To claim some action is necessary to avoid "a Munich" is to offer a justification of enormous magnitude; to claim some other course will lead to "a Munich" is to denounce its proponents in the most damning terms as appeasers. Metaphors appeal to imaginative rationality and often evoke indelible images.

Clausewitz also wanted to draw upon theory to better understand history and the power of our narratives of the past. We need only think of the efforts of his contemporary, Hegel, to recognize this desire as part and parcel of the age. History was viewed as conceptually akin to the biological and geological sciences of the age. It was an exercise in taxonomy that would soon lead to a new and bolder understanding of ourselves and the world we inhabit.

Yet another reason Clausewitz relied upon metaphorical imagery was that he did not trust the established jargon of his day, which was full of rigid (and French!) geometric principles and models. He preferred the new sciences of his time—chemistry, thermodynamics, magnetism, electricity, embryology. These offered novel, high-tech, research-forefront terms for the dynamic phenomena he wanted to discuss. Analytical models can be superior devices in efforts to understand the logical consequences of our assumptions. Their appeal resides largely in their beauty and utility as a form of controlled experiment, especially for modeling phenomena that can be controlled in turn. Yet these models, too, draw upon linguistic structures that we too often associate with literature alone—the tropes of metonymy (allowing the attribute to stand for the whole) and synecdoche (allowing the part to stand for the whole). The attributes we tend to call variables, while the model itself is a scaled-down version of the system we want to investigate. Everything hinges on the assumptions we build into the model.

Clausewitz appears to have understood that metaphors can be superior when the phenomena of interest cannot be controlled, or you are unsure of the necessary assumptions. As evolving things, metaphors are open to novelty, surprise, inspiration and even mutation. They therefore can capture the underlying processes of other evolving entities surprisingly well. If the metaphors are really successful, of course, they may become mere commonplace, frozen images that get passed along unthinkingly and thus constrain our imaginations. But this is also part of the way evolution works. Metaphoring (as opposed to traditional analytical modeling) is a process of exploring some interesting possibility space with contingency and feedback. Each biological mutation is such an exploration, as is each historical event. This is a crucial aspect of Clausewitz's method of analysis and his approach to war.

Conclusion

What is the utility of thinking about war—for our potential opponents and ourselves—in nonlinear terms, especially in the high-tech, research-forefront metaphorical terms from the new sciences? For our opponents the usefulness may be the same as it was for Clausewitz. The Germans were underdogs to the French, and Clausewitz wanted to understand and use against the French their linearizing blindspots. He also needed to be the champion of disproportionate effects and unpredictability, for in a linear, predictable world Prussian resistance to Napoleon after 1807 was futile. The opponents of the United States will be looking for our blindspots in an effort to seize opportunities to surprise and shock us. They may also be able to compensate for their disadvantage in military confrontations such as the Gulf War by consciously striving to affect the political context in order to change the conduct of warfare. An understanding of the porousness of the boundaries between politics and war can be a real weapon against those who envision those boundaries to be impermeable.

We need for our own sake to understand the limitations our imagination places upon us. Linearity is excellent for the systems we design to behave predictably, but offers a narrow window on most natural and social systems. That narrowness sets blinders on our perception of reality and offers a weakness for an opponent to exploit. But if we know our limits, we can minimize the extent and duration of our surprise, reducing its value to someone else. And an expanded sense of the complexity of reality can help us be more successfully adaptive amid changing circumstances. By thinking more constructively about nonlinearity, we might be able to design more robust systems when we need them. A new form of modeling that takes such concepts as self-organization to heart allows structures to bubble up from below rather than be imposed from above. With such tools we might come to understand better the biological and historical processes with which we must deal. And we may come to realize how conventional, analytical predictive techniques can themselves stimulate a self-defeating, unfulfillable desire to control more of the real world around us than is truly possible.

In his opening address at this conference, Murray Gell-Mann was right. The issue is not that we lack information about the world; it is that we need better schemata. We do not know enough about the new sciences to apply them very well yet, but every attempt helps us learn and adapt to the changes with which we must cope.

End Notes

1. See, for example, Carl H. Builder, "Is It a Transition or a Revolution?" *Futures* (March 1993); Samuel P. Huntington, *The Clash of Civilizations: The Remaking of World Order* (NY: Simon & Schuster, 1996); Alvin and Heid: Toffler, *War and Anti-war: Survival at the Dawn of the 21st Century* (Boston: Little, Brown, 1993).

2. On this point see especially Peter Paret, *Clausewitz and the State: The Man, His Theories and His Times* (Princeton: Princeton University Press, 1985; originally published 1976).

3. *On War*, edited and translated by Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), p. 593.

4. This section is based on my article "Clausewitz, Nonlinearity and the Unpredictability of War," *International Security* 17 (Winter 1992/93): 59-90.

5. Along these lines, a very intriguing exploration of what Clausewitz meant by friction and what the term means today has been recently offered by Barry Watts in his *Clausewitzian Friction and the Future of War*, McNair Paper 52 (Washington: Institute for National Strategic Studies/NDU Press, 1996).

6. *On War*, p. 152.

7. A sense of the contrast between the two techniques is offered by Larry Smarr, "An Approach to Complexity: Numerical Computations," *Science* 228 (26 April 1985): 403-08.

8. For a very readable exposition, see George Lakoff and Mark Johnson, *Metaphors We Live By* (Chicago: University of Chicago Press, 1980). For a variety of current approaches, see Andrew Ortony (ed.), *Metaphor and Thought*, second ed. (Cambridge: Cambridge University Press, 1993).

9. For these and other passages about metaphor, see Gemma Corradi Fiumara, *The Metaphoric Process: Connections between Language and Life* (London: Routledge, 1995), here pp. 1-5.

10. *On War*, p. 168.

11. *On War*, pp. 225, 296, 605, 149 respectively.