Technology, Society, and the Infantry Revolution of the Fourteenth Century

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Abstract

Major developments in the technology and technique of warfare are commonly understood to be an important source of historical change. Not only do they alter the character of warfare, but they also prompt broader social developments. This position has been notably adopted by Clifford J. Rogers, who claims that the emergence of newly effective infantry forces was responsible for the rise of the commons during the fourteenth century. This article argues that developments in the technique of infantry warfare during the period were largely a consequence, rather than a cause, of social change. In doing so it calls for a new approach to understanding late-medieval military developments, one which is informed by the view that war is powerfully shaped by the societies which wage it.

THE continuing interest in warfare during the middle ages and the early modern period is to be welcomed.[1] One particular aspect does, however, give cause for concern, and that is the extent to which so much recent literature has focused on relatively narrow developments in the technology and technique of warfare. Technocentric accounts are not of course new: Lynn White's identification of the stirrup with the emergence of the shock charge and the rise of feudalism was published as long

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ago as 1962.[2] More recently, however, technology and technique have acquired new salience as agents of sociopolitical change within the burgeoning literature on the subject of "military revolutions"—a literature which has in large part been inspired by the work of Geoffrey Parker.[3]

In this article I argue that it is erroneous to privilege either technology or technique in such a manner, and that accounts which do so leave certain pressing questions unanswered. My case study is the "Infantry Revolution" of the fourteenth century, chiefly because one of its chief exponents—Clifford Rogers—has been deeply influenced by Parker's thesis. Indeed, Rogers has specifically mentioned Parker as having "added a key new ingredient to the Military Revolution debate: military technology as a causative factor,"[4] and has developed his own views on late-medieval infantry warfare within an adapted version of Parker's framework. Rogers has subsequently downplayed the causative role of technology in more recent versions of his work, preferring to place greater emphasis on developments in the techniques associated with infantry warfare. In neither case, however, has he proved particularly successful in showing how narrow instances of military innovation have led to broader sociopolitical change.

Given the explicitly theorised nature of Rogers's work, I have chosen not to engage with him by simply projecting a series of contrary historical facts against his framework. I propose instead to take a more fundamental approach: one which unearths the problematic character of Rogers's conceptual foundations, and which reveals them to be incapable of supporting the complex nature of the events he is seeking to explain. My own conceptual reference point is drawn from the work of the nineteenth-century Prussian military theorist and historian Carl von Clausewitz, for whom the character of war was conditioned chiefly by social and political factors. Technology, in contrast, was a phenomenon that was foreign to his concerns. I will begin, however, with some general observations about the place of technology in military historiography, and the rather different treatment it has received from those who have made technology per se the subject of specialist study.

There has long existed a view that technology constitutes the most important engine of change in military affairs. Indeed, Robert O'Connell once notably claimed that technology is the only source of change in military affairs. "Neither tactical and strategic ends nor the nature of

2. Lynn White, Jr., "Stirrup, Mounted Shock Combat, Feudalism and Chivalry," in *Medieval Technology and Social Change* (Oxford: Clarendon Press, 1962), 1–38.

3. Geoffrey Parker, *The Military Revolution: Military Innovation and the Rise of the West, 1500–1800* (Cambridge: Cambridge University Press, 1988; 2nd ed., 1996).

4. Clifford J. Rogers, "The Military Revolution in History and Historiography," in *The Military Revolution Debate: Readings on the Transformation of Early Modern Europe,* ed. Clifford J. Rogers (Boulder, Colo.: Westview Press, 1995), 4.

military organizations has proved greatly changeable—only technology, and this is a relatively recent phenomenon," declared O'Connell.[5] Baldly stated views such as this are no longer such a conspicuous feature of the literature. Nevertheless, Geoffrey Parker sees "military innovation" as a product of the "tension between offensive and defensive techniques"—a position which may well have led him to locate the origins of the Military Revolution in the dialectical interplay between gunpowder artillery and the bastion fortress.[6] Andrew Krepinevich has gone further, by suggesting that there have been ten separate instances of revolutionary change in military affairs since the late middle ages, each of which was the result of technological innovation allied to appropriate changes in technique.[7] According to Krepinevitch, a military revolution "occurs when the application of new technologies into a significant number of military systems combines with innovative operational concepts and organizational adaptation in a way that fundamentally alters the character and conduct of conflict."[8] Krepinevitch's view of the processes underpinning military change is thus somewhat more nuanced than that of Parker, although in both cases it is the means (broadly construed) with which wars are fought that play the key role in shaping their character.

As I have already indicated, a rather different position was adopted by Clausewitz, who long ago noted that "war should never be thought of as *something autonomous* but always as an *instrument of policy* [and thus] wars must vary with the nature of their motives and of the situations which give rise to them."[9] The profound manner in which an episode such as the French Revolution altered the character of European warfare without the aid of technological innovation suggests that Clausewitz has a point. Nevertheless, the prevailing view that military change flows principally from innovations in technology and technique allows no real space for social and political influences on the character and con-

5. Robert L. O'Connell, *Of Arms and Men: A History of War, Weapons and Aggression* (Oxford: Oxford University Press, 1989), 5–6.

6. "The armies of the Middle Ages were subject to just that same tension between offensive and defensive techniques from which strategy, and military innovation spring." Parker, *Military Revolution,* 7. The implication is that all military innovation springs from this source, although Parker does not explicitly claim this.

7. Andrew F. Krepinevich, "Cavalry to Computer: The Pattern of Military Revolutions," *National Interest* 37 (1994): 30–42. The technological innovations range from the introduction of the long bow and gunpowder artillery, via developments such as rifled firearms and mechanisation, to nuclear weapons. According to Krepinevich, we are now facing an eleventh such revolution arising from the integration of advanced information technologies into the character of warfare.

8. Ibid., 30.

9. Carl von Clausewitz, *On War,* trans. and ed. Michael Howard and Peter Paret (London: David Campbell, 1993), 100, with original emphasis.

duct of warfare. As we will see shortly, Parker displays little curiosity about the social and political factors which prompted early-modern Europeans to exploit gunpowder as a tool of global expansion with an enthusiasm and effectiveness that was not replicated by other cultures. For his part, Krepinevich cites developments in technology and technique as the source of his numerous military revolutions, whilst failing to engage systematically with the notion that changes in the political purposes for which wars are fought have prompted equally dramatic changes in their character and conduct. He briefly addresses the idea that factors such as strategic culture can influence the character of a military revolution, but such claims seem at odds with the general thrust of his explanation of how such revolutions take place and the idea that there can be a "best" way of adapting to new technologies.[10] It is hard to avoid the conclusion, therefore, that both Parker's and Krepinevich's accounts contain more than a hint of technological determinism.[11]

By way of contrast, those who specialise in the study of technology per se have long rejected technocentric readings of history as overly simplistic. This is largely because attempts to define and defend the premises on which a robust theory of technological determinism might be built have not met with success. Even the strongest advocates of the view that "machines make history" have only felt comfortable propounding a "soft" determinism, one whose influence is itself mediated by social choices. And as Bruce Bimber has rightly observed, this kind of mediated influence cannot strictly be considered deterministic at all.[12] Modern accounts of technological innovation therefore reject the notion of a passive social domain, organised in accordance with some form of autonomous technical logic. Technologies are now understood to consist of both a social and a technical dimension, each of which influences—just as it is influenced by—the other. Technologies may not be an infinitely malleable commodity in our hands, but the forms they take and the pathways along which they develop are certainly shaped by a broad array of human interests and values, and there is no single "best" way of

10. Krepinevich, "Cavalry to Computer," 37, 38, 42.

11. By way of contrast, see MacGregor Knox and Williamson Murray, eds., *The Dynamics of Military Revolution, 1300–2050* (Cambridge: Cambridge University Press, 2001), which seeks to portray major military changes as a consequence, as well as a cause, of social and political change. See, for example, their introductory essay "Thinking about revolutions in warfare," pp. 1–14.

12. I refer here to Robert L. Heilbronner's article, "Do Machines Make History?" *Technology and Culture* 8 (1967): 335–45; reprinted in Merritt Roe Smith and Leo Marx, eds., *Does Technology Drive History? The Dilemma of Technological Determinism* (Cambridge, Mass.: MIT Press, 1994), 52–65. Bimber's insightful essay, "Three Faces of Technological Determinism," is included in the same volume, pp. 79–100.

exploiting technical knowledge.[13] According to the "social shaping" school of thought, therefore, the social domain must be treated as an active component of the innovation process. The message here for military historians is that military-technical innovation is a consequence, as well as a cause, of broader sociopolitical change.

To date, it cannot be said that historians of medieval and early modern military history have wholeheartedly embraced the notion that technology is socially shaped.[14] On the contrary, technological determinism still has a habit of popping up in their work from time to time. Sometimes its influence is revealed by a throw-away comment. Thus we find Maurice Keen claiming that "Gunpowder and larger armies were forcing change" on the character of warfare during the fifteenth century.[15] At other times, a deterministic flavour is created as a result of what is not said. In his monograph on medieval military technology, for example, Kelly DeVries provides an interesting review of the scholarly debate on the impact of the stirrup, and thereby shows himself to be fully cognisant of the charge of technological determinism that has been laid at Lynn White's door.[16] DeVries also expresses a desire to avoid being "overly deterministic" in his own work.[17] And yet, throughout much of the book he limits his discussion to the material artefacts of medieval warfare. Rarely do we find reference to the social contexts within which these artefacts were developed and used. This is a disappointing limitation. From the "social shaping" perspective, much of technology's interest derives from the manner in which it crystallises the attitudes and beliefs of the society which created and used it. Divorced from these attitudes

13. The idea that technology is "socially shaped" has become the orthodoxy in the field. What the term actually means is understood in a variety of different ways, however. For a representative cross-section of recent views on this issue, see Wiebe E. Bijker and John Law, eds., *Shaping Technology/Building Society: Studies in Sociotechnical Change* (Cambridge, Mass.: MIT Press, 1992); Donald A. MacKenzie and Judy Wajcman, eds., *The Social Shaping of Technology*, 2nd ed. (Buckingham: Open University Press, 1999); Knut H. Sørensen and Robin Williams, eds., *Shaping Technology, Guiding Policy: Concepts, Spaces, and Tools* (Cheltenham: Elgar, 2002).

14. An important exception here is Bert S. Hall, whose *Weapons and Warfare in Renaissance Europe: Gunpowder, Technology, and Tactics* (Baltimore, Md.: Johns Hopkins University Press, 1997), seeks to develop a more sophisticated understanding of the relationship between military-technical change and the broader social context in which it occurs.

15. Maurice Keen, "The Changing Scene: Guns, Gunpowder, and Permanent Armies," in *Medieval Warfare: A History,* ed. Maurice Keen (Oxford: Oxford University Press, 1999), 274. There follows a rather Whiggish account of the development of guns, gunpowder, and fortifications between the fourteenth and sixteenth centuries.

16. Kelly DeVries, *Medieval Military Technology* (Peterborough, Ont.: Broadview Press, 1992), 95–122, esp. 102–3.

17. Ibid., xi.

and beliefs, technologies become "museum pieces"[18] and their study shades into antiquarianism. Most important for present purposes, however, is the fact that DeVries's readership might be forgiven for inferring that technology is, after all, the key driving force behind the nature of medieval warfare.

DeVries's failure to realise the potential of his topic is also a surprising one because he himself has criticised the element of technological determinism in Geoffrey Parker's seminal account of the Military Revolution.[19] Parker's version of the Military Revolution, which he claims took place between 1500 and 1800, will require little introduction to most readers of this journal. For present purposes, however, it is worth revisiting some salient features of his thesis because it has exerted an important influence over Rogers's work on military change, to which we will be turning shortly. For Parker, the Military Revolution resulted from the dialectical relationship between gunpowder artillery and new techniques in fortification which were embodied in the *trace italienne.* The accompanying increases in the cost of warfare mandated more efficient means of raising revenue, which in turn led to the emergence of modern bureaucratic states. The improvements in war-making which accompanied these changes subsequently permitted the new European states to carve out a series of global empires for themselves.

Perhaps because Parker's thesis is so elegant, it does cast an unfortunate aura of technology-induced inevitability around the events which comprise his Military Revolution and appears to leave no real space for the influence of human agency or contingent events in the matter. Technology may well have played an important role in the process by which Europe ultimately rose to global dominance, but by emphasising its part at the expense of other factors, Parker has indeed introduced a strong flavour of technological determinism into his account. His failure to explain why each step in the Military Revolution followed on from its predecessor invites the inference that its developmental trajectory was governed by a logic inherent in the technology itself. Ultimately we are left with an explanation of how, but not why, the Military Revolution occurred.[20]

Such problems are of little account to Clifford Rogers, whose views on the relationship between military and social change provide the focus of the next section of this article. On the contrary, Parker is noteworthy

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18. A phrase I have borrowed from John Street, *Politics and Technology* (London: Macmillan, 1992), 9, who uses it in a slightly different context.

19. Bert S. Hall and Kelly DeVries, "Essay Review—The 'Military Revolution' Revisited," *Technology and Culture* 31 (1990): 500–507.

20. Jan Willem Honig, review of *Gunpowder: The History of an International Technology,* ed. Brenda J. Buchanan, *Icon* 4 (1998): 235–39.

in Rogers's eyes because he is one of few military historians who has succeeded in "integrating his material into the 'big picture' presented in general histories."[21] For Rogers, the subject of military affairs is an underexploited area of historical enquiry which has been "overshadowed in importance by social and economic structures and processes." Military historians, he continues, "have been much more effective in showing how revolutions in military technique and technology can transform the art of war than in showing how the resulting changes in warfare can alter entire *societies*."[22] Exceptions in this regard include Lynn White and Geoffrey Parker who, for Rogers, have realised military history's greater potential by identifying causal links between technical or tactical innovation, and social change.[23] Indeed, Parker's thesis provides Rogers with a military-oriented paradigm of social change which he applies to his own period of interest, the late middle ages.

Rogers is not wholly uncritical of Parker, but it is the latter's chronology, rather than his technological determinism, with which he takes issue. For Rogers, Parker's concentration on the period 1500 to 1800 excludes an earlier period of revolutionary change in military affairs, which exerted a correspondingly profound impact on society. This period, which coincides broadly with the Hundred Years' War (1337–1453), is marked by two major discontinuities: the rise to predominance of infantry, followed by the widespread introduction of effective gunpowder artillery.[24] The fact that these two events preceded the introduction of Parker's *trace italienne,* and subsequent changes in the administration of war, has led Rogers to argue against the idea of a single, monolithic Military Revolution. Drawing inspiration from the field of evolutionary biology, he offers an alternative model based on Stephen Jay Gould and Niles Eldrige's theory of "punctuated equilibrium evolution," in which multiple revolutions are interspersed with periods of incremental change. Each of these revolutions, he suggests, is the consequence of a "disequilibrium" which was introduced by the preceding period of revolutionary change. Thus the rise of infantry should be interpreted as a reaction to the dominance of the armoured horseman, the artillery revolution as an answer to the defensive strength of medieval fortifications, the *trace italienne* as a response to the new artillery, and

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21. Rogers, "The Military Revolution in History and Historiography," 1–5.
22. Ibid., 1–2, with original emphasis.
23. Ibid., 1–5.
24. Clifford J. Rogers, "The Military Revolutions of the Hundred Years War," in *The Military Revolution Debate,* 56. An earlier version of this piece was published in *The Journal of Military History* 57 (1993): 241–78.

the administrative revolution as a consequence of the increasing scale and complexity of siege warfare.[25]

Rogers's model is seductive in its parsimony. If it is to be believed, the global dominance of the West can be traced forwards from medieval times via a series of relatively simple innovations in the field of warfare. One can imagine that such an account might prove attractive to military historians who feel that the explanatory power of their specialism has been undervalued. Tempting as Rogers's account might be, however, it is nevertheless unconvincing. Given Rogers's chief sources of inspiration, it is hardly surprising that he attaches great importance to military innovation as an engine of social change. And yet in doing so, he makes himself vulnerable to the same forms of criticism that the work of White and Parker has attracted. Most problematic is his failure to address satisfactorily the question of causality in the relationship between society, technology, and military technique. Indeed, his enthusiasm for the explanatory power of military history has led him to endow technology—and more latterly technique—with deterministic qualities. The notion that the character and conduct of warfare are shaped by, as much as they shape, human society is undervalued. The manner in which this leads to difficulties can be demonstrated by focusing on Rogers's first so-called "punctuation": the Infantry Revolution of the fourteenth century.

We have already seen that, according to Rogers, the Infantry Revolution constituted a corrective response to the predominance of the armoured horseman whose shock charge had decided the outcome of battles since the middle years of the eleventh century. Infantry had continued to play a valuable battlefield role in later years, not least by providing a protective screen behind which the horsemen could draw themselves up in preparation for their charge. But not until the early fourteenth century did foot soldiers begin to win battles on their own account. The first of these victories was achieved by Flemish communal infantry over French men-at-arms at Courtrai (1302). And then at Bannockburn (1314), Scottish infantry inflicted another dramatic defeat on English men-at-arms. The English themselves subsequently dismounted to fight at Dupplin Muir (1332) and Halidon Hill (1334), where they got their own back on the Scots, and at Crécy (1346), where they inflicted a heavy defeat on the French. Swiss infantry likewise inflicted a series of

25. Rogers, "The Military Revolutions of the Hundred Years War," 56–57, 76–77. Rogers is not wholly clear about how genetic and technological evolution are related as processes. Interestingly, this makes him vulnerable to the same charge of "bad poetic science" that Richard Dawkins has laid at the door of Stephen Jay Gould. See Richard Dawkins, "Huge Cloudy Symbols of a High Romance," in *Unweaving the Rainbow: Science, Delusion, and the Appetite for Wonder* (London: Allen Lane, 1998), 180–209.

defeats on Austrian men-at-arms, initially in an ambush action at Morgarten (1315) and subsequently in the open field at Laupen (1339). Henceforth, armoured horsemen declined in utility and their contribution to the outcome of battles became less important.[26]

This process was not as rapid as the term "revolution" might be considered to imply and, as Rogers himself observes, infantry forces did not invariably win against mounted adversaries after 1302.[27] The French, for example, inflicted a series of defeats on Flemish infantry forces during the years following Courtrai, a particularly dramatic episode being the battle of Roosebeke in 1382. These defeats were in no small part the result of Flemish mistakes and overconfidence in the face of French forces acting with a combination of imagination and circumspection—the exact opposite, in fact, of the situation which pertained at Courtrai.[28] In later years, too, developments in the horseman's weapons and armour would play a role in enhancing his battlefield effectiveness. The introduction of a lance rest made it possible to employ a heavier lance than had previously been the case, whilst increased use of plate armour provided greater protection. Moreover, the superior speed of mounted forces would continue to ensure them an important role against a disorganised enemy for a long time to come. It is therefore not surprising that, as late as 1494, the army which Charles VIII of France assembled for the invasion of Italy contained a very large contingent of armoured horsemen, in addition to the siege train for which it is better remembered. It was not until the sixteenth century (the first century, that is, of Parker's Revolution) that the battlefield role of such horsemen was finally eclipsed by that of the infantry and artillery.[29] Whilst allowing that infantry did indeed play a more important part on the battlefields of the early fourteenth century, therefore, we should be careful not to exaggerate the speed with which the contribution of mounted forces declined thereafter.

The real focus of concern in this article, however, is Rogers's contention that narrow developments in the military sphere resulted in broader sociopolitical changes. According to Rogers, the rise of the infantry was accompanied by new forms of "democratic" political repre-

26. Rogers, "The Military Revolutions of the Hundred Years War," 58–59; Clifford J. Rogers, "The Age of the Hundred Years War," in *Medieval Warfare: A History,* 142.

27. Rogers, "The Military Revolutions of the Hundred Years War," 58.

28. For an account of Roosebeke, see Hall, *Weapons and Warfare,* 53–55.

29. Andrew Ayton and J. L. Price, "Introduction: The Military Revolution from a Medieval Perspective," in *The Medieval Military Revolution: State, Society, and Military Change in Medieval and Early Modern Europe,* ed. Andrew Ayton and J. L. Price (London: I. B. Tauris, 1995), 9–10.

sentation, associated with institutions such as the English House of Commons, and a greater degree of independence for communities such as the Flemish and the Swiss.[30] Such events are, he contends, part of a "general pattern" which is that "*ceteris paribus* changes in 'who fights' (very often changes sparked by technological or tactical innovations) will lead more or less directly to corresponding changes in 'who rules.'"[31] But was it really the case that military revolution led to social change during the fourteenth century? And if so, how exactly is it supposed to have happened?

In early formulations of his thesis, Rogers evidently viewed technological innovation as a prime mover in the Infantry Revolution. He points out that close-order formations of infantry were nothing new in the fourteenth century. What made the difference was the introduction of the six-foot-long bow, which provided the English with "missile superiority" over their opponents. As a result, enemy archers could no longer disrupt the cohesion of English defensive formations, whilst any attempt to charge home would also be greatly disrupted by a withering barrage of arrows. Rogers suggests that the resulting English victories (combined with the Flemish success at Courtrai) encouraged others to develop their infantry forces—albeit without adopting the long bow.[32] More recently, however, Rogers appears to have performed something of a *volte face* by claiming that the Infantry Revolution was "*not* based primarily on technological innovations."[33] Good reasons for this change of tack are readily to hand. Most obviously, the introduction of the long bow into the English army preceded the remarkable string of victories against the Scots and the French by fifty years. Rogers himself has suggested that the English army which was defeated at Bannockburn consisted largely of archers equipped with the long bow. As such, its mere presence on the battlefield cannot explain the subsequent record of English success from Dupplin Muir onwards.[34] There were, of course, other technological developments which impinged on warfare during this period, but Rogers finds no compelling reason to believe that any of these provided the English with a battle-winning advantage over their adversaries. Improve-

30. Rogers, "The Military Revolutions of the Hundred Years War," 61–62; Rogers, "The Age of the Hundred Years War," 143–44; Clifford J. Rogers, "'Military Revolutions' and 'Revolutions in Military Affairs': A Historian's Perspective," in *Towards a Revolution in Military Affairs?* ed. Thierry Gongora and Harald von Riekoff (Westport, Conn.: Greenwood Press, 2000), 29.

31. Rogers, "'Military Revolutions' and 'Revolutions in Military Affairs,'" 30.

32. Rogers, "The Military Revolutions of the Hundred Years War," 57, 59–60.

33. Rogers, "'Military Revolutions' and 'Revolutions in Military Affairs,'" 28, with original emphasis.

34. Clifford J. Rogers, "'As if a new sun had arisen': England's Fourteenth-Century RMA," in *The Dynamics of Military Revolution,* 19–20.

ments in the armour worn by English men-at-arms merely brought it up to contemporary French standards, and cannot therefore be construed as providing any form of comparative advantage. In both victory and defeat, moreover, the English had always been better-armoured than their Scottish opponents. Significant developments in horse-breeding were essentially irrelevant to English armies which invariably fought their battles on foot (although they retained a mounted reserve), whilst the introduction of gunpowder weapons onto the battlefield at Crécy appears to have inspired almost as much curiosity as it did fear. Rogers therefore concludes that English battlefield effectiveness during the first half of the fourteenth century "was not technologically driven, though technological development was a significant contributing factor."[35]

How, then, can the upturn in English military fortunes after Bannockburn be explained? For Rogers, a good deal of the explanation resides in the manner in which the English revised their tactics in the wake of defeat. From Dupplin Muir onwards, English men-at-arms dismounted to fight and arranged themselves into a close-order defensive formation flanked on either side by archers. The enemy was thereby subjected to a withering missile fire as they closed, only to be halted by a row of lances (employed like grounded pikes), whilst their flanks continued to be struck by arrows. Caught in such a manner, the attackers were progressively crushed together until they could no longer fight effectively, and in many cases finally suffocated as a result of the tight mass of bodies pressing around them. Technology therefore played an important role in the English victories, but its battlefield potential was not fully realised until appropriate tactical innovations had been achieved. As Rogers—evidently drawing on Krepinevich's model—puts it: "improvements in weapons . . . do not consistently win battles unless employed as part of an effective tactical system."[36] Contrary to his original views on this issue, therefore, the English version of the Infantry Revolution was not precipitated by technological innovation. Rather, it waited on tactical changes which served to integrate existing technologies into more effective configurations on the battlefield. Moreover, the broader potential of these battlefield innovations itself rested on the formulation of strategic moves which would entice an otherwise cautious enemy to attack a strong English defensive formation. To this end, the English would undertake siege operations with a view to prompting battle with the enemy's relief force, or conduct *chevauchées* in an attempt

35. Ibid., 20–22.
36. Ibid., 18–19, 34.

to provoke the opposition into an attack which they might not otherwise have made.[37]

Rogers's shift in emphasis towards the techniques of warfare is understandable given the largely static character of English military technology during the early fourteenth century. An obvious question which follows from this line of reasoning, however, is why did the English adopt new infantry-based tactics for Dupplin Muir in the first place? Rogers suggests that the answer lies in the English defeat at Bannockburn, where their Scottish opponents had fought on foot. The English had copied this innovation from the Scots, who for their part had been encouraged to dismount as a result of the victory achieved by the Flemish communal infantry at Courtrai. Indeed, for Rogers, Courtrai has become the catalytic event of the Infantry Revolution. It is the point source from which subsequent military innovations flow.[38]

The battle of Courtrai was fought between Flemish infantry and the cream of French chivalry on 11 July 1302. For the French, who lost over a thousand men-at-arms, it was a calamitous defeat. Conversely, victory in battle secured wide-ranging privileges for the Flemish commoners. As a result of Courtrai, they "acquired political power, made their own legal system, and controlled their own finances."[39] The outcome of the battle was the result of a number of factors which conspired to favour the Flemish over the French. Not least of these was the strong defensive position that the infantry occupied.[40] They were protected from an attack against their rear by the river Lys, whilst across their front ran two streams which were ultimately to prove a death-trap for the French men-at-arms. During the French council of war which preceded the battle, concerns were expressed about the strength of the Flemish dispositions, but majority opinion was that the foot soldiers would not stand in the face of a mounted charge.

37. Success also demanded strong English leadership in the face of great risks and adversity. Ibid., 29–34. These issues take Rogers's argument on the contextual effectiveness of technology a step further. I have not discussed them in detail, however, because his treatment of tactics adequately illustrates his rejection of technology as the key agent of change in military affairs.

38. Rogers, "The Age of the Hundred Years War," 142; Rogers, "'As if a new sun had arisen,'" 27.

39. J. F. Verbruggen, *The Art of War in Western Europe During the Middle Ages, From the Eighth Century to 1340,* trans. Sumner Willard and R. W. Southern, 2nd ed. (Woodbridge: Boydell Press, 1997), 152. Also cited in Rogers, "The Military Revolutions of the Hundred Years War," 62.

40. A thorough discussion of the battlefield can be found in J. F. Verbruggen, *The Battle of the Golden Spurs (Courtrai, 11 July 1302): A Contribution to the History of Flanders' War of Liberation, 1297–1305,* trans. David Richard Ferguson, ed. Kelly DeVries (Woodbridge: Boydell Press, 2002), 127–51. My account of the battle is also based on ibid., 222–43.

The battle, therefore, began with the French crossbow men advancing towards the streams which ran along the front of the Flemish positions. A screen of Flemish crossbow men that had been positioned on the opposite banks of the streams proved to be outnumbered by their French counterparts and were ultimately forced back towards the main body of infantry. At this point the men-at-arms put in the main attack. And it was at this point, too, that the presence of the streams began to make itself felt on the course of the battle. Neither proved to be an insuperable obstacle, but they did serve to break the momentum of the French advance and reduce the efficacy of the final charge. At those points along the opposite banks where there was adequate space to regain their speed and momentum, the men-at-arms proved able to force their way into the depth of the Flemish formations, but nowhere did they manage to break clean through them and scatter the opposition.

Here we can also see the effects of Flemish weapons and tactics, backed by great resolution in the face of adversity. Massed in close order behind a hedge of grounded pikes, the foot soldiers proved able to absorb the initial shock of the French charge. Thereafter, the Flemish were able to make effective use of their *goedendags,* stout wooden hafts topped by a heavy metal head to which was fixed a long spike. These were used to strike fierce blows against the French horses, and against dismounted men-at-arms who were clubbed down or otherwise despatched by forcing a spike through their armour.[41] Despite all this, the French almost succeeded in breaking through the tightly packed infantry, but were finally thwarted by the intervention of Flemish reserves. At this point the men-at-arms' fate was effectively sealed. Although they repeatedly endeavoured to withdraw in order to gain space for another charge, the Flemish immediately pursued them, thereby denying them such an opportunity. The end came when the French were finally pushed up against the streams that they had earlier crossed. The streams now revealed themselves to be a deadly obstacle for the French who were unable to recross them whilst being hounded by their adversaries. As a result the men-at-arms were either killed on the banks or toppled into the water where they drowned.

The battle was now effectively over and the immediate threat to the independence of Flanders dramatically reduced, as the proven effectiveness of the communal infantry henceforth exerted a powerful psychological effect on French policy towards the region.[42] But for J. F. Verbruggen, the prime beneficiaries of the victory were the common people of Flanders. In the wake of Courtrai, the Flemish workers gained control over the gilds, acquiring extensive administrative and financial

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41. Verbruggen, *Art of War,* 169–70.
42. Verbruggen, *Battle of the Golden Spurs,* 249.

powers within the towns, where a form of democratic government emerged. And since the towns played an important role in the affairs of the county as a whole, the influence of the gilds spread well beyond their walls. As Verbruggen observed, "rarely had a feat of arms given rise to such far-reaching social and political consequences."[43] The situation would, of course, subsequently be reversed at Roosebeke, but in the meantime the Flemish commoners profited from their demonstration that the mounted shock charge need not invariably carry all before it.

Are we then justified in concluding that a set of technical and tactical developments which occurred in response to the battlefield dominance of the armoured horseman were responsible for major social change in fourteenth-century Flanders? The answer to this question is surely "no." Rogers explains how the Flemish gained their independence but not why they endeavoured to do so, and in particular, not why they did so at the beginning of the fourteenth century. If, for point of argument, we view the mounted shock-charge as an eleventh-century development,[44] we are confronted with a gap of around two centuries before a practical response emerges and passes into common usage. If the Infantry Revolution was nothing more than a corrective response to the battlefield dominance of the armoured horseman, why did it not occur more rapidly than this? Why, for example, was the twelfth-century battle of Legnano, in which infantry played a vital role, not a trend-setter?

A possible explanation is that innovations in technique occurred infrequently and slowly in medieval society. As Michael Postan once argued, the dominant position of the Christian church ensured a privileged status for its theology, which left little intellectual space for other, less exalted, forms of learning. The marginalisation of invention and experimentation which resulted was also encouraged by the institutions of lay society. For example, specialist knowledge and techniques were typically the preserve of the craft gilds, which carefully maintained their secrets for commercial reasons. Thus, on the rare occasions that significant inventions were made, their influence tended to remain localised, lending Europe a highly regionalised pattern of specialist knowledge and practices. The innovative and famously successful Bolognese silk industry provides a case in point here. A machine for throwing silk was invented in 1272 but was not found outside Bologna for another 276 years.[45]

43. Ibid., 245.

44. Rupert Willoughby, "The Shock of the New," *History Today,* August 1999, 37–42.

45. M. M. Postan, "Why Was Science Backward in the Middle Ages?" in *Essays on Medieval Agriculture and General Problems of the Medieval Economy* (Cambridge: Cambridge University Press, 1973), 83–84.

A gap of two centuries between the emergence of the shock charge and a response in the form of the Infantry Revolution might therefore seem more credible were it not for the fact that medieval attitudes to the technology and technique of warfare appear to have constituted a significant departure from the norm. Regional specialisation was not uncommon, but it existed alongside a more universal readiness to embrace military-technological innovation. "The technology of war," Postan reminds us, was in the service of princes who "were not bound by the social aims or economic objectives of medieval gilds."[46] Nor was the Church successful in controlling the exploitation of technology for military purposes, as the Second Lateran Council's failure to ban the use of bows against Christian opponents illustrates.[47]

The relative speed and ease with which medieval military practitioners were capable of innovating presents a problem for Rogers. This is all the more so given that so many of the weapons which are associated with the Infantry Revolution were readily to hand throughout the middle ages. The pikes and *goedendags,* which were used to such great effect by the Flemish at Courtrai, were not fundamentally new technologies of war. Spears, for example, provided an important means by which the Anglo-Saxons held off their Norman opponents at Hastings (1066). Long-handled axes supplemented the defence, as is graphically described by Wace in his account of the Norman conquest of England.[48] Just over a century later, Milanese infantry used long pikes to hold off Frederick Barbarossa's knights at Legnano (1176), whilst the Swiss infantry of the fourteenth century won a string of victories with their own version of the long-handled axe—the halberd.[49] Clearly, therefore, innovations in Flemish tactics were not waiting on significant developments in infantry weapons during the early fourteenth century.

All this suggests that the Infantry Revolution was more than a simple set of corrective actions to the threat posed by armoured horsemen. The two-century delay between threat and response demands that we consider factors that are external to Rogers's dialectical interplay between technologies and techniques. Something more is required to explain why Flemish infantry fought French men-at-arms at Courtrai in 1302. Following Clausewitz, I would suggest that the missing ingredient is to be found in the changing social and political complexion of late-medieval Flanders. The timing and, indeed, the origins of the Flemish

46. Ibid., 85.
47. For the relevant canon (Number 29), see Norman P. Tanner, *Decrees of the Ecumenical Councils,* vol. 1 (London: Sheed and Ward, 1991), 203.
48. Master Wace, *His Chronicle of the Norman Conquest from the Roman de Rou,* trans. Edgar Taylor (London: W. Pickering, 1837), 174–76, 201–2, 211, 235.
49. The halberd is briefly discussed in Hall, *Weapons and Warfare,* 36.

version of the Infantry Revolution had less to do with developments in the means of warfare than with changes in the ends for which wars were fought during this period. Turning Rogers on his head, the battle of Courtrai was a consequence, rather than the cause of, sociopolitical change.

An alternative account based on this revised perspective might start with the economic recovery of Europe, which had been gathering momentum since the eleventh century. The resulting increase in market activity generated new opportunities for acquiring wealth above and beyond more traditional means, such as the conduct of war and the extraction of feudal rents. These time-honoured activities were now supplemented by the sale of manufactured goods, which yielded burgeoning profits as the new European cash economy grew in size. Alongside this new form of wealth creation grew new social and political structures. This was particularly noticeable in the flourishing towns of the period, where the personal and customary relations of feudal society yielded to the cash nexus of market economics, in a process which gave rise to a new form of urban, capitalist elite.[50]

Novel sources of social strife were likewise created within urban communities by the crystallisation of this new elite. The monopolisation of political and economic power by rich merchants and the heads of the manufacturing gilds was bitterly resented by the mass of labourers whose lives were subject to disciplinary regimes that were in many ways more oppressive than the institution of serfdom. Chronic social unrest was the result.[51] In the highly urbanised county of Flanders, whose economy had long been dominated by textile production, events came to a head during the last quarter of the thirteenth century. Unrest occurred in most of the major towns in the region, with the workers agitating for improvements to their political and economic position. And then in 1297 events were given a new twist when war broke out between the Count of Flanders, Guy de Dampierre, and his feudal lord, Philip IV of France. Philip rapidly invaded Flanders, making a large number of the Flemish nobility his direct vassals and bringing the towns under French administration. Unfortunately for the king, however, his officials proved less than skilful in managing the political and economic tensions which continued to trouble urban life in the region. In 1302 heavy-handed attempts to quell unrest in Bruges resulted in an armed insurrection that quickly spread to other towns. Philip responded by sending an army to subdue his unruly subjects, although this time it was the Flemish com-

50. For a brief account, see William H. McNeill, *The Pursuit of Power: Technology, Armed Force, and Society Since AD 1000* (Oxford: Blackwell, 1983), 63–68.

51. Eleanora Carus-Wilson, "The Woollen Industry," in *The Cambridge Economic History of Europe,* vol. 2, *Trade and Industry in the Middle Ages,* ed. M. Postan and E. E. Rich (Cambridge: Cambridge University Press, 1952), 398–401.

moners, rather than the nobility, who were the object of his displea-
sure.[52] The battle of Courtrai was the outcome.

From the perspective provided by this account, the Flemish decision
to fight at Courtrai was a consequence, rather than the cause, of major
economic and political change. Situating the battle at the confluence of
these events is helpful, because it offers a clear explanation for why the
Flemish took around two hundred years to develop an effective answer to
the shock charge. Simply put, an infantry-based response to the
armoured horseman was not required until political and economic devel-
opments brought the nobility and the commons into direct conflict on the
field of battle. In other words, the ultimate emergence of such a response
was contingent on a range of factors which are not encompassed by nar-
row accounts based on a dialectical relationship between technologies
and techniques. This reading of events is, ironically enough, supported by
countervailing developments later in the century when Count Louis de
Male attempted to consolidate his grip on Flanders and thereby sparked
off another rebellion. Louis suffered a series of military reverses but was
finally saved by the intervention of a French army, which defeated the
rebels at Roosebeke. It was as a result of his policies, therefore—his
efforts to curb the privileges of the commons—that Louis found himself
with a rebellion on his hands. And because he was ultimately on the win-
ning side, he was able to transform his political wishes into reality.[53]

Of course, accounts such as the one advanced above are hardly free
from problems of their own—problems which are, moreover, particularly
challenging for anyone who might otherwise be tempted to generalise
from the Flemish version of the Infantry Revolution to the late middle
ages as a whole. Firstly, having carefully avoided the pitfalls of techno-
logical determinism, we are now in danger of embracing an equally
unsatisfactory economic variety.[54] This is because the intensification of

52. Verbruggen, *Battle of the Golden Spurs,* 1–26. It was, of course, the case that
elements of the Flemish nobility fought on foot alongside the infantry. They were very
much in the minority, however. Verbruggen estimates that the Flemish army con-
sisted of 8,000 infantry, along with 600 lightly armed auxiliaries and 400–600 nobles.
Ibid., 162, 181.

53. In point of fact, Louis died in 1384 and thus had little time to enjoy the fruits
of his new-found authority. Upon his death, however, the county of Flanders passed
to his son-in-law, Philip the Bold, who took effective measures to consolidate his
power over the region. For a detailed account of the rebellion, see Richard Vaughan,
Philip the Bold: The Formation of the Burgundian State (London: Longmans, 1962),
16–38.

54. "There is no fixed equation: rebellion = social conflict arising from primar-
ily economic causes. For there are no prime causes or series of causes 'in the last
analysis.' In general, a rebellion is a fact of history in its entirety." Guy Fourquin, *The
Anatomy of Popular Rebellion in the Middle Ages,* trans. Anne Chesters (Oxford:
North Holland Publishing Co., 1978), xiii.

market-economic activity which occurred during the second half of the middle ages also demands an explanation. No doubt the economic recovery of Europe can be explained within the context of a far broader set of interconnected events, which include sustained population growth until the mid-fourteenth century, along with developments in the technologies and techniques of agriculture, and the emergence of a strong warrior aristocracy. In the absence of a large rural population producing a reasonably reliable agricultural surplus, the cities in which early capitalist behaviour gained a strong foothold would not have been viable. Likewise, the institution of knighthood provided a bulwark behind which the developing social and economic fabric of Europe would remain relatively unscathed by aggression from external enemies. It would appear, therefore, that the very success of the armoured horseman helped to foster an environment which ultimately produced domestic challenges to his social and military position. Clearly, however, the origins of that environment are far too complex and diffuse to be captured by any simple, single-factor account of change, whether that factor be technology, economics, or anything else.[55]

A second important problem is that, although the socioeconomic changes outlined above may help explain the rising fortunes of the Flemish commons, they were of less immediate relevance to their counterparts in other places. As far as the emergence of the English commons as a self-consciously political body is concerned, other factors were at work here, not least of which was the fiscal impact of the Hundred Years' War on English domestic politics. As G. L. Harriss has shown, Parliament's attempts to reconcile the fiscal demands of the king with the welfare of his subjects required some astute political manoeuvring. "The very rigours of the Commons' predicament," asserts Harriss, "proved fruitful in educating them in the language and practice of politics, and thus preparing their incorporation into the political community."[56] In this instance, therefore, the demands of war did exert a major influence on the character of English society, albeit not in quite the manner that Rogers's dialectical process of "punctuated equilibrium evolution" describes. Indeed, Rogers has himself drawn attention to the influence that the spiralling costs of war exerted on English society and has concluded that the relationship between the military power and the political influence of the English commons was not, in this particular instance, "a simple and direct one."[57] Regardless of how we interpret the

55. For further discussion of some of these factors, see Robert-Henri Bautier, *The Economic Development of Medieval Europe,* trans. Heather Karolyi (London; Thames and Hudson, 1971), 79–109; McNeill, *The Pursuit of Power,* 63–65.

56. Gerald L. Harriss, "War and the Emergence of the English Parliament, 1297–1360," *Journal of Medieval History* 2 (1976): 53.

57. Rogers, "Military Revolutions of the Hundred Years War," 61–62.

effects that war exerted on English domestic politics, however, the situation remains rather different from the Flemish case, where socioeconomic developments resulted in a more assertive commons which only then resorted to war in order to improve its lot. The Swiss example is, moreover, different again.[58] Here we see communities of pastoral farmers which habitually raised infantry forces for their own defence and which would subsequently use them to achieve the independence of the cantons. The fourteenth century witnessed no major break with the past in this regard. Rather it was the Austrian men-at-arms' forays against the Swiss that highlighted the latters' martial skills, initially at Morgarten and subsequently at the pitched battle of Laupen.

Clearly then, the origins of the Infantry Revolution as a generalised phenomenon and the nature of its relationship with broader social, political, and economic processes raise a complex set of questions which are beyond the scope of any single article to resolve. On the contrary, the picture is likely to remain fuzzy, and therefore unsatisfactory to minds that seek a clear and concise account of complex phenomena. Nevertheless, we must be content with such fuzziness, because attempts to identify a single cause of the Infantry Revolution, whether technological, economic, or otherwise, simply cannot do justice to the complexities of human behaviour and the multiple factors on which it is contingent. As David Herlihy noted in an insightful essay on the origins of feudalism:

> To understand human decisions and human behaviour requires something more than an appreciation of immediate stimuli. It requires, too, a consideration of the totality of forces, material and spiritual, which condition, influence or direct human responses. And because we are dealing with human beings, the forces which helped shape their actions must be recognized as multiple, subtle, and infinitely complex.[59]

In other words, there is no mono-causality. Explanations of the emergence of feudalism, the Infantry Revolution or, for that matter, the rise of the West to global dominance, must cast their nets widely if they are to convince. This, in turn, demands an approach with which many historians are likely to feel uncomfortable. From this perspective, understanding a phenomenon such as the Infantry Revolution requires the historian to stand back from his or her narrow area of specialism and to survey wider vistas, which may contain not only military history, but

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58. I am grateful to my colleague, Dr. Jan Willem Honig of King's College London, for alerting me to this point. For background on the Swiss, see Verbruggen, *Art of War,* 112–15.

59. David Herlihy, ed., *The History of Feudalism* (London: Macmillan, 1970), xxv.

also many other varieties including political, economic, cultural, and intellectual.[60]

This is, of course, a very ambitious project. No individual can realistically hope to acquire a respectable depth of historical knowledge across such a range of areas; there is simply too much to know for this to be possible. But for all the difficulties, it is necessary that military historians make genuine efforts to locate their work within its broader context. If their specialism is to realise its potential, it will not be through the creation of a technology-focused master narrative which wrests primacy from more traditional perspectives on the past. Rather, it will be when the concerns of military historians are woven with those of many others into Herlihy's "skein of causes."[61] In the meantime there remains much work to be done in relation to issues such as the Infantry Revolution, for quite clearly, existing accounts based on the technology and techniques of warfare are unsatisfactory in many regards.

60. See also the comments of Fourquin, *Anatomy of Popular Rebellion,* xiii–xiv.
61. Herlihy, *History of Feudalism,* xxii.