METHODOLOGY FOR HISTORICAL ANALYSIS

Military historians cannot manipulate independent variables and conduct randomized experiments to establish causal relationships, as does a physical scientist. History presents observational data, making it impossible for the historian to state that "x causes y." Our goal is to document a relationship or discover an association between two or more variables in the targeted set of cases, without establishing causality.[1]

Usually a victory or defeat in a particular battle depends on a host of factors, and many of those factors are often interrelated. For example, can the historian use case studies in which a nonswarming army defeats a swarming army and attribute that victory to any one variable such as concentration of mass? It is very difficult to know what other variables such as command, logistics, morale, or even blind luck play in determining the outcome. When Crassus's Roman legions were cut to pieces by the swarming Parthians in 53 B.C., was the Roman defeat due to incompetent leadership or the asymmetric balance between highly mobile horse archers and slow-moving infantrymen? Any single variable—such as technology—cannot be viewed in isolation.

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[1]Research designs that rely on observational data are called *quasi-experimental designs*. Since quasi-experimental designs cannot randomly assign subjects to levels of the independent variable, causal inferences about the effects of independent variables (such as swarming) on dependent variables (such as the battle outcome) are difficult to make. As with all observational datasets, the threat of selection or omitted-variable bias exists. However, designs based on observational data are useful when the goal of the researcher may be simply to explore the distribution of a certain variable in some population of interest. In this case, considerations about internal validity have no relevance.

It follows that, in studying historical cases, it is often helpful to combine observation with an evolving theory—to identify the likely key factors and relationships among factors early in order to be better able to "see" and interpret historical cases with some sophistication.[2] The purpose is to evolve good, structured insights, even if rigorous and precise conclusions cannot be drawn from the historical cases alone.

In this work, it became apparent early on that it would be important to pay attention to the two sides' relative mobility, situational awareness, quality of training and leadership, and weapon characteristics. Other key factors emerged, such as the army's willingness to take losses and the objective of the conflict.

RESEARCH QUESTIONS

The goal of this research is to answer the following research questions:

Historical Pattern-Matching

- When did swarming work and when did it fail?

- Are there any apparently dominant factors?

- How do swarmers fare against nonswarmers?

- Does swarming have particular advantages for offense rather than defense, or does it apply to both?

- How does swarming success vary according to terrain?

- How did swarmers satisfy their logistics demands?

- How have technological limitations on command, control, and communications affected swarming?

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[2]Qualitative tools can serve a useful purpose. It is possible to draw inferences, eliminate hypotheses, pattern-match, and make analytic generalizations. Because historical data are observational, the historian cannot conclude that the dominant factors that emerge from pattern-matching play a causal role in swarmer battlefield success. However, it is a plausible interpretation not contradicted by the results.

Doctrine

- Can a swarming doctrine be used across the military conflict spectrum, from low-intensity to high-intensity? Or are certain environments and missions more conducive to swarming?

- How does the swarmer avoid defeat in detail?

- What are proven countermeasures to swarming?

- What is the best organizational design for swarming?

  - Should units be combined-arms units?

  - Should swarm units have organic Combat Service Support (CSS) capability?

  - What mix of direct- and indirect-fire capability should swarm units have?

The answers to the historical pattern-matching questions should shed some insight into the doctrinal questions of the future.

SELECTION OF SWARMING EXAMPLES

Examples of swarming can be found throughout military history, from the numerous horse-archer battles in ancient times to the urban street skirmishes in Mogadishu, Somalia, in 1993. Swarming has been employed at the tactical and operational levels, both defensively and offensively, in cities, deserts, jungles, and oceans, by conventional and unconventional forces. This analysis does not look at every swarming example in military history but uses a cross section of cases, each case unique in terms of the force structure of opposing armies and the type of swarming exercised. The goal is to cover what can be described as the prototypical cases, not to exhaustively describe every case that has ever occurred. For example, if the many obscure battles between the Roman legions and the Parthian horse archers usually resulted in a Roman defeat, perhaps the selection of a single battle in 53 B.C. can serve as our "unsupported infantry versus swarming horse archer" prototype.

Several important variables—including weapons, training, terrain, and mission—do not remain constant across the cases. What does

remain constant is that one of the belligerents used swarming while the other did not. The ten general cases in this study are listed below in Table 2.1. One case is from a peace operation, two could be classified as "guerrilla actions," and one is a naval case. In another case, swarming was employed both at the tactical and operational levels of war; in yet another, swarming occurred at the operational level, but conventional tactics were employed at the tactical level. Various horse-archer cases against different types of opponents are covered, as is a case of a light infantry swarmer versus a light infantry nonswarmer.

Lessons based on ancient military units like the horse archer are relevant to the evaluation of modern, mechanized-war doctrine because certain principles of military science remain constant no matter what technologies prevailed at the time. For example, the concepts of "standoff firepower" may equate to the composite bow in one age and to the Army Tactical Missile System (ATACMS)—delivered Brilliant Anti-Tank (BAT) submunition in another. Also, because swarming may seem to violate some principles of war, performing a survey of swarming examples helps us understand the conditions under which we are justified in violating (or reinterpreting) those principles.[3]

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[3]The principles of war art are offensive, mass, economy of force, maneuver, unity of command, security, surprise, and simplicity, as defined in the 1993 FM 100-5, *Operations* (U.S. Department of Defense, Washington, DC: Department of the Army).

Table 2.1

Historical Swarming Cases

Case Study, Specific Battle or Period of Sample Conflict, and Time (assume A.D. unless otherwise noted)	Terrain	Swarmer Mission: Defensive or Offensive?	Swarmer Description	Nonswarmer Description	Uniqueness of Example
Scythians vs. Macedonians, Central Asian campaign, 329– 327 B.C.	Steppe, desert	Both	Bow cavalry	Heavy infantry phalanx supported by heavy cavalry	Horse archer against Macedonian phalanx with supporting light cavalry
Parthians vs. Romans, Battle of Carrhae, 53 B.C.	Steppe, desert	Both	Bow cavalry	Heavy infantry in legions	Horse archer against unsupported legions
Seljuk Turks vs. Byzantines, Battle of Manzikert, 1071	Open, rolling	Both	Bow cavalry	Bow cavalry, cataphracts, bow infantry	Horse archers against combined-arms opponent
Turks vs. Crusaders, Battle of Dorylaeum, 1097	Desert	Both	Bow cavalry	Heavy cavalry	Horse archers against heavy cavalry and supporting light infantry
Mongols vs. Eastern Europeans, Battle of Liegnitz, 1241	Steppe, plains	Offensive	Light and heavy cavalry	Heavy cavalry and infantry	Tactical and operational swarming
Woodland Indians vs. U.S. Army, St. Clair's Defeat, 1791	Woods	Offensive	Tribal warriors (light infantry)	Light infantry, some field artillery	Swarming light infantry versus light infantry
Napoleonic Corps vs. Austrians, Ulm Campaign, 1805	Woods, mountains, steppe	Both	The tactical unit was combined arms (musket infantry, cavalry, horse artillery); the operational unit was the semi-autonomous corps	Combined arms (musket infantry, cavalry, horse artillery)	"Operational" swarming combined with conventional tactics
Boers vs. British, Battle of Majuba Hill, 1881	Rolling grasslands	Defensive	Dismounted cavalry	Infantry	Guerrilla warfare with swarming-like tactics
German U-boats vs. British convoys, 1939–1945	Naval	Offensive	"Wolfpacks" of U-boats	Convoys of merchant ships guarded by destroyer teams	Naval example
Somalis vs. U.S. Commandos, Mogadishu, October 3–4, 1993	Urban	Both	Tribal militia (light infantry)	Light infantry, light vehicles, helicopter gunships	Peacemaking operation

NOTE: Cataphracts are heavy cavalry armed with lance, bow, and sword.