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Battlescape analysis: Towards a Unified Method for Battlefield Archaeology

Are Skarstein Kolberg

Introduction

Battles are ephemeral by nature, short moments in history that leave lasting impressions. While modern battles may scar a landscape with bomb-craters, pre- to early modern battles are more difficult to detect on the surface. This article sets out to define a unified method for battlefield archaeology for both desktop and in-field use, at first developed and intended for pre- to early modern battlefields in which action was more confined in time and space, as opposed to modern technological warfare, but it may also be applied to the latter.

The method has been named ‘battlescape analysis’ and will be defined in the following sections of the paper. This is not a novel approach per se, but novel in its way of combining arms, and to a greater extent adding factors such as weather and seasons, tactics and soundscapes.

If war is like a game of chess, as the saying goes, then battlescape analysis may be likened to the different variables in a model of game theory, only in reverse; the outcomes would have been dependent on how the different agents acted in terms of interests, on their training, and on perceived risks versus gains, whether to advance or to retreat (Ho et al. 2022). All this, in turn, would have been impacted by physical factors such as landscapes with their lines of movement (infrastructure) and barriers (natural ones of human-built defence works). Together, these variables would have affected behaviour in a battle, and so one need to analyse past actions based on limited information to read behaviour in landscapes, and to detect battlefields.

Battlefield archaeology is an interdisciplinary approach which is in turn a subdiscipline of conflict archaeology (Figure 1). Likewise, the method of battlescape analysis consists of numerous approaches that make a whole. Consider the Battle of Britain (1940), how it is a whole made from everything from airfields and bunkers to plane wrecks and memories, i.e. cognitive aspects, as people’s lives were shaped by the presence of foreign bomber crews and the brooding threat of German raids and dogfights above. As Tim Lynch and Jon Cooksey (2007) state:

[…] This approach to viewing landscape as an interaction between geography, people and events allow us to think more multi-dimensionally about what ‘battlefields’ actually are […] Battlefields, then, are the sites within the wider landscape in which these struggles take place and where we can expect to find material evidence of their having taken place in the form of monuments and artefacts. We need to think of them as part of the
whole country and as a product of the history that preceded them, rather than as an event confined within narrow physical or temporal boundaries. Perhaps this is best illustrated by considering the landscape of what has become known as the Battle of Britain. (Lynch and Cooksey 2007: 27)

John Carman (2005: 217) argues that skirmishes should be distinguished from battles, but they may, as pointed out in this article, be parts of a battle or a scene of conflict. For instance, a battle can break down into multiple phases, involving smaller skirmishes (Kolberg 2011; 2019b).

A Brief History of Research

The roots of battlefield archaeology can be traced to early-modern antiquarians and historians, and their interest in historic battles, often related to an overall interest in surveying landscapes and the drawing of maps (Gerrard 2003:5–23; Kolberg 2011). As Christopher Gerrard states, early antiquarianism and the roots of modern archaeology “cannot be divorced from a growing interest in cartography” (Gerrard 2003:9). The study of battlefields would later fall under the auspices of military and local historians as archaeology developed into a more specialised discipline during the 19th century (Foard and Morris 2012). A lack of methodology and professionalism, as well as archaeological focus ensued, and as a result, the modern discipline of battlefield archaeology does not fully appear until the 1980s (Douglas and McFeaters 2010; Midwest Archaeological Center). A well-known and published project within the field are the surveys at the site of the battle of Little Bighorn (Douglas and McFeaters 2010; Scott 2010), in which metal detectors were successfully employed by the Midwest Archeological Center, with projects in the United Kingdom following, among others the Bloody Meadows project that involved work on battlefields from the English Civil War (1642–1651) (Carman and Carman 2006). In 2012, Glenn Foard and Richard Morris (2012) published The Archaeology of English Battlefields, adding to the national registry of battlefields (Register of Historic Battlefields). The latter presents various methods for localising sites by looking at topography and toponomy, as well as GIS and metal detecting. Metal detecting was, likewise, applied when discovering the presumed site of the battle of Teutoburger Forest (9 A.D.), or at least one of its phases as the Romans were attacked along a great line in Germany; first by an amateur detectorist in an area in which antiquarians had been finding Roman coins for centuries (Clunn 2009), then professional archaeological field work and research ensued (although there has been some uncertainty whether or not this is actually the famous battle or some minor skirmish) (Harnecker 2004; Varusschlacht museum und park Kalkriese 2023).

Centre for Battlefield Archaeology at the University of Glasgow have in the more recent years contributed to the field through volunteer work (community archaeology) amongst other things. Examples are the Scottish battlefields of Culloden (1746) (Centre for Battlefield Archaeology 2021), Philiphauge (1645) (Ferguson 2012) and Prestonpans (1745) (Ferguson and Pollard 2008; Ferguson 2010), as well as Waterloo Uncovered (2016; 2018).
Likewise, antiquarians contributed to the interest in historic battlefields in Scandinavia. The Norwegian antiquarians Gerhard Schøning (1910 [1778]a; 1910 [1778]b) and Lorentz Klüwer (1823), who was also a military cartographer, combined their interests in landscape and history when discussing Norwegian battlefields, such as the Battle of Stiklestad and Rastarkalv. Schøning (1910b [1778]:69, 70) wrote about Stiklestad in the 1770s, and connected finds of swords and axes in the fields to the site of the battle, while Klüwer (1823) draws a connection between the battle and the presence of gravemounds. Although their conclusions ended up being false, if not premature, they were pioneers in the sense that they drew upon the actual landscape with its structures, as well as archaeological finds, instead of adhering to sagas alone.

Larger European projects in recent times span from the Battle of Waterloo (1815) to excavations of mass graves from the Balkan-wars in the 1990s. The latter draws heavily on forensic archaeology. Sweden quite early on established a unit for Battlefield Archaeology under the auspices of the Swedish National Heritage Board (Riksantikvarieämbetet), later to be disbanded. Under the authority of, amongst others, Bo Knarrström, several battlefields from medieval to early modern times were examined. One important example is the Battle of Landskrona (1677), which can be said to have laid the foundations for battlefield archaeology in Sweden (Knarrström 2004).

In USA, the military tactical planning tool, or rule of thumb for the common G.I. in action even, KOCOA was applied to historical battlefields, an acronym for:

- Key terrain features
- Observation and fields of fire
- Cover and concealment
- Obstacles
- Avenues of Approach

KOCOA allows for a viewshed analysis of battlefields and landscapes (Heckman 2007), as well as an assessment from the point of view of a commander. The site of the battle of Gettysburg (1863) was the first archaeological site where KOCOA was fully employed in 1996 (ABPP 2016).

In 1990, the American Battlefield Protection Program (ABPP) published its survey manual, revised at the latest in 2016. The manual integrates KOCOA, and even offers some advice on how to survey sites of known battles, complemented with printable forms that may be handed in by the surveyors. The manual summarises the process of surveying with the following points (ABPP 2016):

- Research the battle event (accounts, maps etc)
- Develop a list of battle defining features (terrain/topographic features, or manmade structures that aid in identifying sites of battles)
- Visit the battlefield
- Locate, document and photograph features
- Map troop positions and features on a USGS topographic quadrangle
- Define battlefield boundary and core engagement areas for each battlefield
- Assess overall site integrity and threats
- Define a potential National Register boundary for the battlefield
- Complete documentation

As the state-of-the-art chapter demonstrates, there is an abundance of works and surveys related to battlefield archaeology, as well as numerous methods adapted from other disciplines. What also becomes apparent is the lack of a defined method, as the different approaches mentioned above seemingly are being applied in an ad-hoc manner. In the following chapters the need for a unified method for battlefield archaeology will be discussed, starting with a presentation and definition of the method of Battlescape Analysis.

**Battlescape Analysis**

The method is made up of several parts, namely the assessment of sources, landscape analysis,
geology, toponymies, tactics (both in terms of placing armies in the landscape and for assessing possible movements), the audio-visual as well as the climatic. Battlescape analysis can be divided into theoretical and practical approaches, although there is clearly a degree of interdependency between the parts.

Theoretical Approaches: Pre-Fieldwork

Landscape Analysis

Battlescape analysis is based around the method of Archaeological Landscape Analysis by Visual Methods, as defined by Terje Gansum, Gro Jerpåsen and Christian Keller (Gansum et al. 1997). The method has theoretical as well as practical applications and works by dividing landscapes into landscape rooms by means of structuring elements such as topography and infrastructure. An objection can be made that this approach to landscape analysis conveys a static understanding of landscapes, but the intention is merely to provide an overall framework for simplifying something as abstract as a landscape, making it more tangible and intelligible. The method can be likened to a machine, or a box, in which you feed variable data, which can give yielding varying results. The result of the analysis, thus, is dependent on the information you feed into it, more than of the method in itself. In other words, an open-source method that can be tweaked and adapted. The method provides cartographic understanding of landscapes, but also helps us grasp how it appears when located in it, thus acting as a mediator between the map and the terrain (Figure 2).

A landscape room consists of a floor, walls and a roof. Plains such as meadows and fields constitute floors, while edges, cliffs, hills, ridges and mountains constitute walls. The sky is the roof. Passages, such as roads and rivers, between the walls make lines of movement into subsequent landscape rooms, while boundaries hamper and prevent movement (Gansum et al. 1997). Rivers and streams may be both boundaries and lines of movement. While they may be sailable by boats, they may also be difficult to cross. There is also the exploitation of hindrances to avoid combat, as there was not always a wish to fight but to win by presence and numbers alone (Hjardar and Vike 2011).

Local conditions and topography affect how landscapes are divided into rooms. A coastal landscape differs from an inland landscape, both in topography and in how they are seen phenomenologically. For a person accustomed to inland territories, the sea may be seen as a frontier, while a person from a coastal area perceives the sea as a connection between islands and regions (Fredriksen 2019).

Landscape analysis has numerous archaeological applications that help us understand the different phases of a landscape, equivalent to the stratigraphic layers of a ditch. The theory behind the method states that the placement of monuments and structures are not arbitrary but dictated by how the landscape room is delimited and furnished. Understanding how monuments such as gravemounds and barrows often addressed arteries in the landscape may help us detect old roads and vice versa (Gansum et al. 1997).

Within battlefield archaeology, landscape analysis focuses more on the tactical use of terrain and landscape rooms, and here is where the importance of infrastructure and lines of movement becomes important. Landscape analysis can be applied to divide landscapes into defensive and offensive landscapes. While the former is manifested by lines of defence that close off and control access, for instance fortresses and trenches, the latter may likewise be defined by trenches, but also by siege structures intended for breaching fortifications (Lynch and Cooksey 2007). It is all a matter of direction of movement. Lines of movement also translates into invisible lines such as lines of fire. The range of projectiles may be calculated to deduce the different stages of a given battle – projectiles can range from arrowheads to musket- and cannonballs. In KOCOA, this is what translates to avenues of approach and fields of fire (ABPP 2016).

In terms of airplanes, lines of movement translate to flight trajectories. These are subject
to proximity to airstrips, carriers or means of refuelling, or topography in the case of low flying and approaches. The latter may also be used for barriers. Other barriers and elements of defensive landscapes in terms of airplanes are FLAK batteries, radars, enemy airstrips from which fighters may be scrambled, and barrage balloons.

A battle usually has different stages in time and space, ranging from initial action to the dissolution of formations and the spread of fighting (Figure 3). A finds distribution map may reflect this but is also suggestive of duration as the time is a limited resource that in turn puts limitations on movement in each space (Hägerstrand 1970).

Landscape analysis also has the potential of debunking myths pertaining to battles and conflicts (Kolberg 2018b), for instances when it comes to commemoration and created identities
(McNutt 2017), or for explaining the locations of churches and monuments, as sites of battles are quite often falsely localised to the latter, especially battles of national and religious significance (Kolberg 2011).

Recreating past landscapes

Agriculture and factors such as intensified modern ploughing as well as landscaping have transformed, and are still transforming, landscapes. Formerly forested areas are now under cultivation, and grave mounds once commanding central places along field boundaries and roads have been ploughed over (Kolberg 2011). To ‘recreate’ past landscapes, as was done in connection with a recent examination of the battle of Banockburn (1314) (Tipping et al. 2022), one needs to trace changes in topography and toponyms, as well as infrastructure and changes in land use. In connection with the work at Bannockburn (Tipping et al. 2022a; 2022b), sediment and peat samples were analysed to glean data on past agrarian use of the landscape, as well as general geological changes. This was then compared to later literary sources to the events of the battle, as well as to the landscape.

Sources to changes in landscapes and landscape use vary from old maps, air photography and geological data, to name a few. A full landscape analysis should encompass the following:

- Geology and landscape changes (topography)
- Changes in infrastructure
- Assessment of toponyms
- Soil and sediment sampling

Sources to such changes include the following:

- Cartography (old maps can contain lost structures which can be georeferenced in GIS applications.)
- Toponyms (often found in old maps and in local traditions)
- Air Photography
- LiDAR data (Light Detection and Ranging, airborne surface laser scans that enhances features such as trenches and ramparts, and strips vegetation (optional) (van der Schriek and Beex 2017; Tipping et al. 2022). See Figure 4.)
- Geological data and maps (soil types etc.)
- Scientific examinations and sampling (morphological samples, shoreline displacement curves)
- Historical weather data
- Written sources

Climate

Climate and weather are important parts, and even dimensions, of landscapes and regions, and subsequently also for a battlescape analysis. A landscape is ever transformed by shifting seasons and changing weather (Figure 5), in turn affecting how it is perceived by observers and how tactics are applied, while the overall climate causes wholesale adoptions affecting factors such as tactics more generally. Consider how the same landscape may look very differently in winter and summer, and how snow hides elements from plain vision, while unmetalled roads, fields, ridges and edges may become muddy and slippery from heavy rain.

The overall climate and seasons in a region will generally also have an impact on campaigns, especially larger logistic operations involving the crossing of seas or difficult terrain such as mountains (Kolberg 2018a). As illustrated by the rough graphs below (Figures 6 and 7), the majority of campaigns involving some degree of logistics in pre- to early modern times seemingly have found place in the summer months of the year, but even modern campaigns may be marred by sudden and harsh shifts in weather from season to season, as demonstrated by the German Operation Barbarossa (1941) and subsequent failed operations in the Soviet Union (USA 1952). According to the U.S. Army Research Institute’s manual for peer-to-peer training, an officer should be able to “understand effects of
terrain [and] weather on enemy and own forces (see the terrain, see the enemy, see yourself: by conducting this analysis properly you can anticipate enemy movement [...]” (Costanza et al. 2009: E-3).

The Audio-visual Aspect

The last section covered climate. There is an interdependency between climate and the audio-visual: Heavy fog may make it difficult to see your hands in front of you all the while hiding objects nearby, while the sound of heavy rain and wind diffract and block soundwaves (Lacanna et al. 2014). Landscapes are both visually and audibly transformed by shifting seasons, which in turn affect the following:

- Ground conditions (for instance frozen, wet or covered in snow)
- Canopy and vegetation in general
- Weather and atmospheric conditions (fog, rain, snow, high or low air pressure)

The above factors affect both sightlines and soundwaves in a landscape. Different ground conditions absorb sounds differently, as do canopy and vegetation versus bare autumn and winter landscapes. Weather and atmospheric conditions will also act upon soundwaves and how they travel through space. Sound is either muffled by soft surfaces, reflected off hard surfaces, blocked/hindered, or otherwise diffracted, affecting the overall soundscape and how it is perceived by observers (Aylor 2005; Attenborough 2014). Also, the loudness of sound will dissipate with distance. Canopy and vegetation may also interfere with or block sightlines, hiding either the observer or the subjects of observation. Conditions such as rain, fog and snow will likewise decrease sightlines and vision to varying extents. Heavy rain, snow, blizzards or fog may render nearby objects close to invisible. Topographical barriers such as hills and ridges may diffract or block soundwaves (Piechowicz 2015), as well as impede vision.

According to sources, both the written and the archaeological record, signalling horns and oral commands were used to a large extent in prehistoric to early modern battles (Goldsworthy...
Commands during a battle are crucial, but signals and oral commands are subject to weather and atmospheric conditions, as well as topography. If barely audible, it may pose a problem in terms of commanding troops. In connection with modern military action, less favourable atmospheric conditions may affect radio communication, as well as oral commands. Not being able to see the landscape as well as the enemy is also a problem. In terms of the latter, time of day matters almost as much as the time of year. Fighting in light conditions varying from dusk to the pitch black of night poses problems in terms of visibility.

A case study to be drawn upon here is an example from the Battle of Stiklestad in Norway (A.D. 1030), in which it is relayed in a skaldic verse that Harald Sigurdsson Hardrada, Olav Haraldsson’s half-brother, escapes the battle and seeks refuge at the former royal manor of Haug from where he could hear the battle cries (Kolberg 2011; Sturluson 2011b). However, it is unlikely that sound will travel from the site traditionally connected to the battle towards Haug, as there is a low protruding ridge closing the site off from the rest of the landscape in direction of Haug (Figure 8). From this, the conclusion may be drawn that the battle took place some 450 m to the south of the church, where one can draw a straight line towards Haug (Kolberg 2011; Sturluson 2011b). Still, there is also a problem of distance, as Haug is located more than 2 km west of Stiklestad, and that normal human voices will not travel that far, unless one screams loudly under favourable conditions (Wong 1986). It is therefore not unlikely that one could hear screams and shouting from the battle at Haug, but it is all dependent on the above factors. To conclude, the information related to sound may indicate another site for the battle, or it may simply be a dramatic effect. In other words, the physics of sound may be used to deduce a different location, or to discredit altogether the source.

There is, of course, practical, or experimental, approach to sound and vision. Soundscapes can be tested by placing a source of sound and an observer in a given landscape, likewise, sightlines may be tested. Furthermore, testing under various conditions, providing a phenomenological experience that may aid in understanding the dynamics of the battlescape. When it comes to landscape changes, reconstructed landscapes could be tested by a GIS viewshed analysis. This may, in turn, aid in placing battle lines in the landscape.

Finds of artefacts related to events may likewise serve to discredit information on sounds.
Figure 8. Map of Haug in relation to Stiklestad, as well as sound waves in relation to topography. Background map from Hoydedata.no.
made by eyewitnesses or in literary sources. In connection with a recent examination of the site of the Porvenir massacre (1918) in Texas (Keller 2021), in which civilians of Mexican descent were shot under uncertain circumstances, the finds of U.S. army cartridges helped to disprove an account from a former soldier who claimed that the massacre were carried out by Texas rangers and vigilantes. According to the soldier, they were escorted away by rangers, and after a while could hear sounds of gunfire volleys. The finds of U.S. army cartridges, in this case, helped to put the blame where it belonged, and to shed light on the event of the massacre (Keller 2021).

Tactics

[…] once forms of organized warfare become recognisable within any form of human society, its relationship to the practical factors of landscape and climate becomes equally recognisable. (Hill og Wileman 2002: 14)

The above quote is very to the point. Climate affects how battles are fought and armies move in a landscape, but also affects logistics. Deep snow not only hides roads and paths, but also make landscapes more inaccessible, just as heavy rain may have the same effect on unmetalled roads and fields. Crossing a muddy field may prove tiresome as your boots sink in deeply, consider then the effect on larger armies carrying heavy equipment. Furthermore, knowledge about tactics and manoeuvres can help deduce how and where armies and troops have moved in a landscape and on a battlefield, but also in order to place lines in the landscape (Kolberg 2011; 2019b).

When looking at the Norwegian archaeological record and the introduction of the leidang, a ship based proto-conscription system, in the 10th century (although with possible earlier roots) it becomes clear that the sea has been important to many aspects of life along the coast, including the military. Each ship district, or skipreide, was obliged to muster men and equip ships in times of unrest (Kolberg 2019b). This was partly due to inaccessible hinterlands and bad roads, the coast was simply faster and easier to travel when it came to logistics, provided the weather was safe to sail in.

Land based armies and troops are also subject to weather and topography, as demonstrated by the ill-fated campaign of lieutenant general Armfeldt in the Norwegian county of Trondheim in 1718; heavy rain made unmetalled roads impassable and rivers uncrossable (Kolberg 2018a). Upon retreating to Sweden, several soldiers froze to death when they encountered a blizzard. In numerous early campaigns and wars, ranging from the Viking Great Army’s invasion of England in the 9th century to the 30 Years War, armies settled in camps for the winter as the cold weather and barren landscapes took its toll on men and supplies (Peters 2012; Hadley and Richards 2016; Harrison 2016). However, that does not rule out fighting during winter. In connection with the Battles of Re Project, information in the written sources stating that the second battle took place during winter 1177 is supported by finds of winter horseshoes (Jacobsen 2013).

Practical Approaches and Method; In-Field and Post-Surveying

The practical, in-field, part of a battlescape analysis boils down to investigating areas, or landscape rooms. GIS applications provide powerful tools for spatial analysis that allows for systematising all spatial data, adding layers for different elements and periods, in turn helping to visualise landscapes. GIS may be applied at all stages of an investigation, for instance to plot finds. The number of finds will depend on period and preservation (Foard and Morris 2012). Successful metal detection results will yield find distribution maps, which in turn can yield information on the course of a battle and its different phases (Figure 3). Musket balls provide us with an illuminating example. Sometimes they are found with casting sprues still in place. This may be tell-tale of rushed campaigns and perceived imminent threats as care is not taken to cut the sprues off prior to distributing the bullets.
to the soldiers (Mandzy 2015). At the site of the Porvenir massacre, cartridge finds aided in the identification of the perpetrators, as well as to shed light on events (Keller 2021). But large assemblages of personal and civilian equipment that cannot easily be explained by other contexts should also be considered and recorded, as larger campaigns required long supply trains, and as these kinds of objects are easily lost on a field of battle (Foard and Morris 2012). To illuminate, finds of large coin hoards and other personal artefacts helped locate parts of the Battle of the Teutoburger Forest (Harnecker 2004; Clunn 2009).

Metal detecting is a reoccurring theme, as it were; a staple of battlefield archaeology, and perhaps the only method that is common to all the fieldwork. Metal detecting has been applied in projects spanning from the examinations of the Battle of Little Bighorn to European projects such as the English battles of Towton (1461) (Sutherland and Schmidt 2003) and Bosworth Field (1485) (Foard and Morris 2012) to Swedish battlefield surveys such as Landskrona (1677) and Axtorna (1565) (Knarrström et al. 2005).

Metal detecting, likewise, was applied with some success in connection with the Battles of Re-project (1163 and 1177). Designated search areas were gleaned by looking at written sources and comparing topography. These areas were in turn eliminated and/or narrowed down with help of finds (Figure 9). Geophysics and trenching were applied to rule out any connection to archaeological structures such as bulldozed or plowed-down gravemounds (Jacobsen 2013). Artefacts possibly connected to the 1163 battle were found in search areas 1A, B, C, 2 and 4, and consisted of arrowheads, horse related equipment and personal belongings. A total of 3500 objects were unearthed (Jacobsen 2013). Most of the weapons, mainly arrowheads, were found in area 1A. The interpretation of the finds in respect to different phases was that the battle had begun with a volley of arrows in area 1A (Jacobsen 2013).

Figure 9. Finds distribution map from the battle of 1163. Jacobsen/VFK 2013.
Geophysical survey can be applied to investigate any underground archaeological features such as graves to eliminate the possibility of any non-battlefield contexts, as was done in connection with the Battles of Re Project (Jacobsen 2013). Geophysics can also reveal features and excavations such as entrenchments and possible mass graves (Foard and Morris 2012). The latter do pose ethical issues but may also be good sources of information on tactics and weaponry, akin to eyewitness accounts. In 2011, a mass grave with 47 individuals related to the battle of Lützen (1632) was discovered (Nicklisch et al. 2017). Most of the skeletal remains exhibited bullet wounds inflicted by pistols, some of which would have been fatal. From this can be gleaned that, although lacking precision, hits from pistols could kill in three out of four cases, but it may also be tell-tale of the tactics employed by cuirassier cavalry on the battlefield which involved riding up to enemy ranks, firing the one shot with their pistols, then turning around and withdrawing (Nicklisch et al. 2017).

A lot of work lays in interpreting the results, in which the theoretical approaches are helpful; there is an interdependency between method and theory. A knowledge of tactics aid in interpreting find distributions. Results may be compared to the written sources in order to support or undermine the information given; such was seen, for instance, in connection with Heimskringla (Kolberg 2019b).

Discussion

KOCOA, as presented at the beginning of the article, is being applied to battlefield archaeology (Brown et al. 2017; McNutt 2014) and has the potential of yielding good results. One obvious benefit is the inherent GIS compatibility in terms of its integration of viewshed analysis, although not exclusive to KOCOA. However, the method, or tool, was never originally intended for archaeology, but for planning present operations, boiling down to a problem of retrospection versus planning – i.e. planning upcoming battles, versus detecting and deducing past ones. KOCOA and the manual of American Battlefield Protection Program (ABPP 2016), presupposes readily available material such as historical maps and accounts, while only briefly discussing archaeological applications in terms of assessing the landscape. The manual is mostly for preservation and management purposes, and therein lies its shortcomings.

KOCOA has been used at a few European sites, among others in connection with a project involving the Roman campaign in Monte Bernorio in Spain (c. 25 B.C.), where the location of the fortifications under attack, and artefacts possibly related, were already known from earlier excavations. The terrain was then used to try to deduce tactics and course of action (Brown et al. 2017). In 2014, Ryan Keefe McNutt (2014) published his PhD dissertation on Scottish medieval battlefields, integrating KOCOA in his suggested method of desktop analysis of lost battlefields, and arguing for the benefits of the former to the latter. In his dissertation, the method has been modified to fit various needs, and supplemented with other methods, rather than having been adopted wholesale. The method does not suffice on its own, as pointed out by McNutt (2014).

The shortcomings of KOCOA, goes to show the usefulness of a unified method that is more intended for archaeology. It is also worth noting that the archaeological application of KOCOA has been subject to some degree of criticism (Brown et al. 2017).

LiDAR, likewise, is a method with a lot of archaeological potential. However, as with KOCOA, it works better on some areas than others. For instance, it can aid in detecting natural features such as old riverbeds and streams, provided this is crucial information, and it works well in areas where there are structures, or in connection with actions such as sieges during which entrenchments would have been dug. Figure 4 shows perfectly well how LiDAR can be used to highlight fortifications. Other features are bomb craters, ditches, ammunition depots and infrastructure (van der Shriek and Beex 2017). Both KOCOA and LiDAR were
applied when examining the Roman attack on the Cantabrian oppidum of Monte Bernorio in Spain (Brown et al. 2017), as there were known fortifications in the area, as well as an archaeological record of past finds, attributable to the action. LiDAR helped highlight structures, while KOCOA could be applied based on the known whereabouts of the fortifications, as if planning the attack in retrospect. This, however, would work less well on a site of a skirmish without any recognisable or supposed structurers, and where there are no changes in topography to be traced, or in which a prior archaeological record is non-existent.

LiDAR, thus, is a good tool when it comes to recreating past landscapes and to detect or to highlight some types of features in given landscapes, but it cannot be used in order to delimit action. In order to detect sites of action, for instance battlefields, more hands-on and/or intrusive methods like metal detecting, trenches and digging are necessary. Following which, a theoretical framework should be superimposed upon the results and the unearthed material to allow for interpretation and context.

While metal detecting may be a great aid to archaeology, and at the core of battlefield archaeology and its methodology, it may also pose a problem in terms of collecting and the lack of recording of unprotected finds (Foard and Morris 2012). This is especially true for Norway, as post-reformation (1537>) artefacts such as lead bullets are not required to be handed in by law, with an exception for coins up to 1650 (KULML, n.d.). There were a lot of minor battles and skirmished in Norway during the 17th and 19th century in connection with the many wars between Denmark-Norway and Sweden, about which valuable information is lost by the lack of proper artefact recording, as artefacts from this period are not required to be handed in. The same applies to the Second World War.

Metal detectors do also have limited depth ranges. In cases where land- and mudslides have shaped the landscapes and covered earlier surfaces under thick layers of clay or other materials, as is the case with the landscape around Stiklestad (Kolberg 2011 : 5,56), more intrusive methods like trial trenching with a machine-excavator should be considered as metal detectors will not be able to detect objects through thick overlying layers, and original grass and field surfaces can be preserved. This does not rule out metal detecting, however, but calls for combining arms. Against intrusive methods such as trenching detecting, however, is the argument that it is costly, time-consuming and more damaging to arable land.

To state the obvious: Metal detector finds must be interpreted. Not only in terms of context, but also in terms of identifying types of objects. While the former sometimes may be quite clear, this need not always be the case. The arrowheads found at Re were cast into doubt as to whether they were arrowheads or not, and consequently their possible connection to the battles. This is partly due to little research on typology and that the demand for arrowheads during the civil war period in Norway (1130–1217(/40)) were high due to increased levels of aggression, leading to hastened production and lower quality. There is also little comparative material for the period in Norway (Jacobsen 2013a:112–119). A more recent analogy may illustrate the point: hastily cast musket balls with the casting sprue intact were quite widespread during the 17th to 18th century due to large demands. Function before form (Mandzy 2015:154–176). All the above will affect the localisation and identification of battlefields and their different phases.

As for the development of a more clearly defined method, Douglas D. Scott and Andrew P. McFeaters stated in 2010 that:

[…] employing archaeology to assess contextual aspects of conflict and warfare is challenging, and there is still not a fully refined archaeological vocabulary or conceptual inventory for this topic […] it is only recently that necessary tools, methodology, and theoretical approaches have been combined to allow serious scientific contributions to the holistic study of past human conflict. (Scott and McFeaters 2010: 104)

Scott and McFeaters seemingly point to a unified methodology, but almost ten years later, Foard
Table 1. Select list of major projects and the methods applied. The table is simplified and does not delve into differences between projects, such as topography, time period and source material.

<table>
<thead>
<tr>
<th>Battle/Location:</th>
<th>Year of action</th>
<th>Found/Examined in:</th>
<th>Methods:</th>
<th>Detected?</th>
<th>Published:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axtorna, Sweden</td>
<td>1565</td>
<td>2005</td>
<td>Metal detecting, GIS, topographical analyses.</td>
<td>Possibly. Spread out/widely distributed finds from one of its phases.</td>
<td>Knarrström et al. 2005a</td>
</tr>
<tr>
<td>Landskrona (Ylleshed), Sweden</td>
<td>1677</td>
<td>2003-2005</td>
<td>Metal detecting, GIS, topographical analyses.</td>
<td>Yes</td>
<td>Knarrström 2004</td>
</tr>
<tr>
<td>Little Bighorn, USA</td>
<td>1876</td>
<td>1958-2005</td>
<td>Metal detecting, GIS, topographical analyses, excavations</td>
<td>Yes</td>
<td>Scott 2010</td>
</tr>
<tr>
<td>Lützen, Germany</td>
<td>1632</td>
<td>2006-2011</td>
<td>Metal detecting, GIS, topographical analyses, air photograpy, geophysics, excavations, osteological analyses</td>
<td>Yes</td>
<td>Schügerl 2015; Nicklisch et al. 2017</td>
</tr>
<tr>
<td>Philiphaugh, Scotland</td>
<td>1645</td>
<td>2012</td>
<td>(Community Archaeology), metal detection, basic topographical examinations, geophysics, GIS, test trenching</td>
<td>Probable</td>
<td>Ferguson 2012</td>
</tr>
<tr>
<td>Prestonpans, Scotland</td>
<td>1745</td>
<td>2008-2010</td>
<td>(Community Archaeology), metal detection, basic topographical examinations, geophysics, GIS, test trenching</td>
<td>Probable. Finds distributions indicate the last phase of the battle</td>
<td>Pollard and Ferguson 2008; Ferguson 2010</td>
</tr>
<tr>
<td>Re, Norway</td>
<td>1163</td>
<td>2011-2013</td>
<td>Metal detection, GIS, geophysics, topographical and toponymic analyses, infrastructure, strategic assessments, test trenching</td>
<td>Possibly</td>
<td>Jacobsen 2013</td>
</tr>
<tr>
<td>Re, Norway</td>
<td>1177</td>
<td>2011-2013</td>
<td>Metal detection, GIS, geophysics, topographical and toponymic analyses, infrastructure, strategic assessments, test trenching</td>
<td>Possibly</td>
<td>Jacobsen 2013</td>
</tr>
<tr>
<td>Red Bank (ved Fort Mercer), USA</td>
<td>1177</td>
<td>2014, 2020</td>
<td>KOCOA, Public archaeology, metal detection, LiDAR, geophysics, test trenching, excavations</td>
<td>Yes</td>
<td>Catts et al. 2017; Rowan University 2023</td>
</tr>
<tr>
<td>Teutoburger-Wald, Germany</td>
<td>9 e.Kr.</td>
<td>1987-</td>
<td>Metal detection, test trenching, topographical/cartographic and toponymic analyses, excavations</td>
<td>Possibly. Some phases.</td>
<td>Hamecker 2004; Vanusschlaght Museum und Park Kalkriese 2023</td>
</tr>
<tr>
<td>Towton, England</td>
<td>1461</td>
<td>1996-</td>
<td>Metal detection, GIS, geophysics, topographical and toponymic analyses, test trenching, excavations</td>
<td>Yes</td>
<td>Sutherland and Schmidt 2003</td>
</tr>
<tr>
<td>Waterloo, Belgium</td>
<td>1815</td>
<td>2015-</td>
<td>Metal detection, GIS, geophysics, topographical and toponymic analyses, test trenching, excavations</td>
<td>Yes. Parts of it/some of its phases.</td>
<td>Waterloo Uncovered 2016; 2018</td>
</tr>
</tbody>
</table>
Kolberg and Partida (2018: 14) stated that the only battlefield investigation to be fully published in accordance with international scientific standards to date is the English battle of Bosworth Field, England (1485). Foard and Partida (2018: 14) further states that “the method has still to be properly defined and developed.

The lack of a unified method is illustrated Table 1 of archaeologically examined battlefields and sites of aggression. The table demonstrates a degree of discrepancy of methods, with GIS and metal detecting being the most common traits. The uncertainty as to whether some of the battles have been positively detected goes to demonstrate the difficulty in interpreting finds and contexts. That is not to discredit all the work that has been done within battlefield archaeology, including numerous publications on the subject, and their applied methods. Likewise, the approaches that make out the method suggested in this article are not novel alone, but the problem is that they are all nuts and bolts separate from a frame- or bodywork to put them into an intelligible system, as it were.

Summary: Towards a Unified Method

Battlefield archaeology is by nature an interdisciplinary approach, drawing on many disciplines. The method can be divided into theoretical and practical parts, although there are no watertight divisions in between as the approaches are interdependent.

Battlefield archaeology has the potential to lift mythical veils, but also to discredit or to provide nuance to available information such as written sources. Questions to potentially be answered are which kind of tactics were employed, how many combatants were there, which routes were chosen, and where in the landscape did fighting take place, to name but a few, but a common language is lacking, and hence the unified method of battlescape analysis, as suggested in this article. The constant interplay and interdependency between the different approaches demonstrate how they are all necessary in order to fully understand battles and battlefields.

Battlescape analysis draws on the following disciplines and methods:

- Archaeology
- Geology (to detect changes in the natural landscape)
- Landscape analysis (to detect changes in the cultural landscape, as well as monuments and their relation to arteries such as roads and rivers, but also lines of movement, that including sound and vision)
- Philology (written material, toponymy and etymology)

Battlescape analysis uses the following sources:

- Archaeological data (objects that may speak for themselves, such as projectiles found on or in relation to a battlefield)
- Cartography and cartographical applications (old maps can contain evidence for lost structures and may be georeferenced in GIS applications. Viewshed analyses may be used to test visibility and sightlines)
- Toponyms (often found on old maps and in local traditions)
- Air Photography
- LiDAR data (Light Detection and Ranging, airborne surface laser scans that enhances features and strips vegetation (optional). See Figure 4)
- Geological data and maps (soil types etc.)
- Scientific investigations and sampling (morphological samples, shoreline displacement curves)
- Historical weather data
- Written sources (for instance descriptions of topography, accounts on the travel of sound and similar, to be compared to the present landscape and reconstructed past landscapes where relevant)

Summary

Ever since the survey at the site of the battle of Little Big Horn in the 1980s, the number of battlefield archaeological
projects has been rising. Still, despite increasing research and publications on the subject, a clearly defined and unified method for battlefield archaeology that connects all the loose ends is still lacking. This paper sets out to present a unified method for battlefield archaeology, presented here as Battlescape Analysis. A battlescape is made of everything from overall logistics, climate and weather, tactics to the very battlefield itself; a whole that is more than the sum of its parts. Battlefields are parts of complex eco-systems in which an interplay of different agents and actants takes place. The different approaches that make out the unified method are mostly not novel but the intention of the article is to present a common language to facilitate work on the subject across boundaries.

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