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Scutum di Dura Europos, unico esemplare pervenuto.
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The battle mechanics of the Hoplite Phalanx

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Abstract: The primary structural characteristics of the phalanx formation are its width, its depth and its density, while there are many other secondary ones-structural, functional, psychological- and of extreme importance nonetheless: weaponry, shock/striking weight, flexibility, mobility, coherence, durability, collective protection and cost. The interaction among all these features produced the winner in symmetric confrontations (phalanx against phalanx, of similar or different type and tactics) and the verdict in asymmetric ones (like hoplites against tribal warriors). This paper, based on primary sources so as to avoid the haze of later interpretation, aims to review the identity of the phalanx formation focusing on various aspects: the creation, function and comparative weight of the mechanics/dynamics, the importance of the initiative, the phases of struggle, the individual combat skills and the G-factor (generalship).

Keywords: phalanx mechanics, ancient warfare, hoplite tactics, army organization

Introduction

The hoplite phalanx was a massive formation allowing decisive fighting in open field, to ensure territorial dominance[1]. It is the archetypal phalanx, the term both predates and antedates the hoplites. If the Sumerians and the Egyptians are a bit controversial in this respect[2] despite fully satisfying the looser definition as "cohesive and massive formation"[3], the Greek Bronze Age had such a formation carrying the same name in Homer[4] and the Macedonian phalanx[5] continued the tradition for some two centuries[6]. The name is not a

1 Hdt VII.9
2 Maekawa 2003; Goldsworthy 1997; Bradford 2001
3 Hanson 1991
4 Hom. Il XIII, 129-131; XVII, 352-365
5 Diod XVI.3,2
6 Hanson 1991; Krentz, 1985

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sine qua non: in Medieval Europe phalanxes in all but name dominated the fields for quite some time[7].

The primary characteristics of a phalanx formation are its width, its depth and its density[8]. There are many other secondary ones and of extreme importance nonetheless: weaponry, shock/striking weight, flexibility, mobility, cohesion, durability, collective protection and… cost[9]. The interaction among all these features produced the winner in symmetric confrontations, i.e. phalanx against phalanx, similar or different) and the verdict in asymmetric ones, like hoplites against skirmishers/tribal warriors or cavalry, or lighter line infantry. The most important characteristic of the hoplite phalanx is that the main feature in its formation is the shield[10], a defensive weapon that can be used offensively in both technique and tactics[11]. Other phalanxes, occasionally relied on the shield, such as the Sumerian, Greek Bronze Age, Egyptian[12] or not. The latter, despite not depending on the shield to function, may be divided into shielded phalanxes, as was the Macedonian[13], where there were shields performing an ancillary function, or altogether unshielded phalanxes, such as the Medieval European[14].

Creation and formation

The equipment used within the hoplite phalanx clearly predates it and was never designed for such a role[15], but once used in such a way it evolved and adapted[16].The formation must have been developed by King Pheidon of Argos in early 7th century[17]. Its basic attribute was the double-grip, rimmed and concave *Hoplon (hóplon)*, named also Argive shield, (Hanson 1999), due to invention/

7 Anderson E. 2012
8 Pritchett 1974; Sekunda 2000; Luginbill 1994; Goldsworthy 1997; Rey 2011; Wheeler 2008; Hanson 2013
9 Lazenby 1991; Goldsworthy 1997; Hanson 1999; Sekunda 2000
10 Plut. Apoph 220a
11 Goldsworthy 1997
12 Maekawa 2003; Grguric 2005; Goldsworthy 1997
13 Jones 2006; Hammond 1996
14 Anderson E. 2012
15 Van Wees 2013; Snodgrass 1967; Anderson J. 1991; Brouwers 2007
16 Snodgrass 1965; Krentz 1985
17 Bradford 2001

modification or alternatively, to large-scale adoption by said King Pheidon; the shield named the respective warriors, the *Hoplites*[18] and ultimately the formation (Hoplite phalanx). Some reservations on the issue of the name[19] are rather unwarranted. Amongst a Hoplite's panoply, including both arms and armor, only the Argive shields could be snatched away by stormy wind[20]. If logic is not proof enough, in the passage it is explicitly mentioned that the concerned troops left their shields - *aspídas* on the spot, full with stones in the hollow of the bowl, and came back the next day to collect their *hopla (hópla)*.

The term "hoplite" may have been used more loosely, at a later date, as for the Egyptians in the Battle of Cunaxa[21] in order to denote shielded shock line infantry, able to shove[22]. The original meaning meant the troop with *hoplon*, and troops were named by their issue of shield (*peltastés*, *thureophóroi*) or its lack (*gymnètes*), but for special purpose weapons (archers, slingers etc.). It is conceivable that the notion of Herodotus of the Persians as unarmed - *anhoploi* [23] and *gymnetes* - literally "naked" but in a military context "shieldless"- with attire deprived of weaponry- *esthètes steroumenoi hóplon* -[24] refers to the lack of shields for the rank and file of the Persian *Sparabara* line infantry once the *spara* shield-barrier is overrun[25]. It is impossible to imply that the Persians had no weapons at all, in both passages. Since *hopla* in Greek may refer to the Argive shield, *sensu stricto,* or to weapons in general, *sensu lato*, but NOT to armor specifically, the use of similar words in these two cases should be read as referring to the shields, not to any other item of weapons kit.

The *hoplon* shield and the hoplite panoply were not developed all at once, nor were they intended for close-packed warfare[26]. Providing excellent all-round protection due to shape, freedom of movement and much room for precise han-

18 Snodgrass 1980 & 1967; Hammond 1967; Hanson 1989; Connolly 2006)
19 Lazenby and Whitehead 1996; Brouwers 2007
20 Xen Hell V.,4,17-8
21 Xen Anab I.8,9
22 Xen Cyrop VI.2,10 and VII.1, 33
23 Hdt IX.62,3
24 Hdt IX.63,2
25 Sekunda and Chew 1992
26 Brouwers 2007; Van Wees 2013

dling due to its double-grip system[27], contrary to the body-shields or the central-grip shields of previous dates[28], they were meant for wealthy, excellently trained aristocrats who would master their secrets, potential and weight with care-free, continuous training[29]. It was not a common amenity, neither the shield nor the panoply[30]; the cost was considerable[31]. The analogy with medieval knights is striking.

Still, as the defensive power of the panoply outdid the offensive[32], an orderly and densely packed group, taking advantage from the even higher level of protection afforded by the collective, concerted action that functioned in a synergistic fashion, especially against missiles[33], could sweep its opponents rather easily[34]. The ability of more troopers to engage simultaneously one opponent, thus overcoming his defensive abilities, was just as important, and a dividend of adopting a close formation with fixed distances and positions. But the most important thing was that in close proximity much of the expertise in weapons handling was inapplicable[35]. This allowed for savings in both equipment[36] and training[37]. All these facts together brought a wealthy, non-noble class into play, as they could afford the new weaponry and become tactically efficient rather fast. This was the birth of the hoplite phalanx.

Although at later dates the panoply was discarded for the keeping of the shield and perhaps the helmet, especially fully open, cheap, comfortable helmets[38], this must be put into context: it was not due to physical or tactical restrictions (which were there, of course, in the guise of weight, comfort, mobility, awareness) but to economic ones[39]. For a phalanx, a *hoplon* shield was necessary, no doubt.

27 SNODGRASS 1967; LUGINBILL 1994; GOLDSWORTHY 1997; KRENTZ 1985; HANSON 1991
28 CONNOLLY 2006; SNODGRASS 1967
29 VAN WEES 2013; SNODGRASS 1967
30 THUC. VIII.97,1
31 NILSSON 1929; VAN WEES 2004 & 2013
32 HANSON 1989 & 1999
33 CONNOLLY 2006; WARRY 1995; LAZENBY 1991; HANSON 1989; SNODGRASS 1967
34 NILSSON 1929; BRADFORD 2001; REY 2011
35 GOLDSWORTHY 1997; LUGINBILL 1994; ANDERSON J. 1991; HANSON 1989 & 1991
36 HANSON 1991 & 1999
37 HANSON 1989; ANDERSON J. 1991; BRADFORD 2001
38 SEKUNDA 1986
39 CONNOLLY 2006; SEKUNDA 1986

Cuirass and greaves were very advantageous but not necessary[40]. In broken ground, they were a liability, but this is overrated: in broken ground phalanx could not be formed and thus the hoplites were very vulnerable, but for their panoplies. Thus, in the Greek colonization, where small detachments were fighting against enemy colonials or unfriendly natives for the right to a leisured, civilized life[41], the hoplite panoply was never questioned despite its cost[42] in the 7th and 6th centuries. The reason for the lighter phalanx, which evolved in the relatively more wealthy states of the late 5th century, was socio-mechanical: it allowed the arming of more low-income dwellers at public expense[43], an event rather unwelcome in aristocratic or timocratic societies[44]. And the numbers were all important in phalanx versus phalanx[45]. Given that a large proportion of hoplites rarely if ever were expected to face the enemy spears, as the direct threat in set-piece phalanx combat affected the 2-3 first ranks at most[46], while expeditionary duty and skirmishing became the order of the day[47], this shedding of armor is most understandable.

The three primary attributes of the phalanx interact in a temporal dimension: if in a phalanx engagement the one of the opposing phalanxes is wider than the other (or much more maneuverable), it can achieve a flanking[48]. Flanking at the unshielded, right side will immediately destroy the enemy by spearing straight at the bodies, and, if some troops turn there to present shields, the creation of weak points in the phalanx structure both in the ranks in contact with the enemy and in the depth of the phalanx will make the collapse total. No decent general would allow this, which means that a flanking at the left was perhaps easier. There the flank is shielded and spearing, shoving and psychology take some time to decide the issue. During that time the extended flanking phalanx must hold and not disintegrate, nor break frontally. Usually by extending its width a phalanx

40 Plut. Apoph 220a
41 Van Wees 2013
42 Sekunda 2000; Krentz, 1985
43 Snodgrass 1967; Sekunda 2000; Connolly 2006
44 Pritchett 1974; Snodgrass 1967; Nilsson 1929
45 Nilsson 1929; Krentz 1985
46 Hanson 1989 & 1991
47 Hanson 1999 & 1989
48 Krentz 1985; Hanson 1989

decreases its density, allowing the enemy front-line troops multiple concentrated engagements by spearing or shoving against smaller numbers of own file-leaders, and or infiltrations between enemy files[49].

In the opposite sense, in order to sustain the density, and avoid the two above-mentioned issues, it may opt for decreased depth[50], thus risking being overthrown by shoving action. After the initial exchange of spear-thrusts while approaching to each other, where the depth is good only for replacements as gaps appear in the front-lines due to casualties[51], it is possible to come into closer contact and start shoving by their shields the enemy[52]. It must be stressed that reverting to *othismos* (*ōthismós*) is possible; not unavoidable as spearing and spears held static in array may prove interceptive[53] and thus fighting from sparring distance may continue and be the norm, as suggested by many scholars[54].

Shoving might also happen earlier, if the approach of at least one of the two is at the double, crossing fast the verge of the spear points, possibly shattering some spearshafts and coming into shoving[55]. In the shoving match, depth is the most important attribute, as it provides both durability (physical but also functional, to make up the casualties of the front ranks) and assault mass[56].

Thus, if by spearing and/or shoving the flanking phalanx is disintegrated frontally before the flanking move has taken its full effect on the opposing phalanx, the battle is lost[57]. This is why the numbers have exceptional importance in phalanx warfare[58]. And it is also the reason other approaches had been tested, so as to tackle this issue. For example, with extensive collective training, as was the Spartan practice[59], men of a rather shallow phalanx may coordinate efficiently to produce the same pressure and shoving power as a less cohesive and coordinated,

49 Hanson 1989
50 Kambouris 2000
51 Goldsworthy 1997
52 othismos; Hanson 1989; Anderson J. 1970; Luginbill 1994
53 Matthew 2012
54 Goldsworthy 1997; Matthew 2012; Krentz 1985
55 Sekunda 2000
56 Matthew 2012; Sekunda 2000
57 Hanson 1989
58 Rey 2011
59 Sekunda 1998, 2000; Lazenby 1991

even if deeper, force. Or, charging at a run, a less dense formation can overrun by sheer impact a denser one; at least the 2-3 front lines were the best troops are posted[60].

Mechanics/Dynamics

The most logical presumption is for three possible density levels for the hoplite phalanx[61]. The densest option, with overlapping, "locked" shields (*synaspismós*), of some 1.5 foot/0.5 m[62] was a purely defensive formation[63], where the phalanx received an enemy attack, including massive archery or cavalry charges, under maximum protection, mutual and collective support, stability and ease of coordination[64]; maneuvering, attacking or retreating, in fact most individual moves like turn, half-turn, about-face, duck are virtually impossible[65] but the offensive push forward, to literally "push back" the enemy is feasible and actually *sine qua non*[66]. Such order has its best effect against an aggressive enemy who shall engage, especially if the terrain favors the defender[67].

The locked shields are a very tricky issue: Pictures in pottery and sculpture show a rightward shields' rack (Fig 1-2-3), with the left part of a shield under the right half of the next leftward shield. Field experiments conducted by the *Koryvantes Association of Historical Studies* have shown, though, that a leftward rack (right half of the shield under the left part of the next rightward at its right) is more solid to uphold the shield-wall integrity when clashing with opponents who try to smash it by impact and momentum, such as Achaemenid infantry in Plataea[68].

The second option is the usual, battle-order density (closed ranks), when a hoplite is protected by the collective formation, especially from missiles, but has

60 Sekunda 2000; Goldsworthy 1997; Luginbill 1994
61 Goldsworthy 1997; Sekunda 2000
62 Pritchett 1974; Sekunda 2000
63 Goldsworthy 1997
64 Lazenby 1991
65 Arr. Tact XI.3
66 Pritchett 1974; Rey 2011; Kambouris 2000
67 Xen. Hell VII.4,23; Thuc IV.93,3
68 Hdt IX.62,3

Figure 1. The striding stance can be observed in both hoplites, and the resting of the massive argive shield on the shoulder. The left figure also shows the operation of the double grip system and the ability to carry a spare weapon held with the *antilabe*. The archer, left (the quiver is visible next to the left hip), is obviously in *parentaxis*.

space to use his weaponry and dress his posture; it is some 3 feet/1m per hoplite[69]. Arrian uses the term "*Pyknosis*"(*pýknōsis* - condensation) but he may refer to the Macedonian phalanx only[70]. The collective mobility is not unlimited, but allows the usual brisk-paced advance "*Ephodos*"[71] (*éphodos*) to thrust, clash and then shove (Fig 2). It is not clear whether moves like turn, about-face etc. were possible; they should, though, if for nothing else, just to permit transformation to open ranks.

The third option is an open-rank format, perhaps 6 feet/ 2m per file[72] used for

69 PRITCHETT 1974, SEKUNDA 2000
70 ARR. TACT XI.3
71 SEKUNDA 2000
72 PRITCHETT 1974

Figure 2. The *Ephodos* and *Epidromi* were ideally delivered in pace and in perfect coordination; real-life might have been deviating especially regarding the latter.

maneuvering, dressing, transforming, advancing in column, approaching and/or charging at a run or any other movement of a deployed phalanx, thus allowing maximum flexibility. As noted by Xenophon, the open format combines low density with increased depth[73]. It allows carefree personal movement, even on uneven ground, without too much danger from the butt-spikes of other hoplites' spears, but there is no collective action and concerted effect, neither immediate side cover[74]; still, functional (indirect) cover, meaning direct threat to an enemy attempting at one's flank was still possible[75], as was the concentration of two mens' spears against a single foe, to overcome his shielding by two thrusts delivered nearly simultaneously at an angle of nearly 90 degrees .

73 Xen. Const. Lac XI.6
74 Goldsworthy 1997
75 Krentz 1985

The necessity of body armor for the first rank(s), exposed not only to shoving but to clashing, spearing, direct and indirect missile fire, stabbing by dirk and sword, hacking by saber or ax and to violent blows by obtuse instruments, like nearby shields, both friendly and enemy during the clash[76], poses another problem: where to field the fleetest and youngest and lightly clad hoplites, tasked to pursuit of enemy light troops who might harass their phalanx; such skirmisher hoplites (*Ekdromoi - ékdromoι*) are attested in early 4th century[77] but might have been present at least since the battle of Marathon, at 490 BC or even since the introduction of the *Hoplitodromos* (*hoplitodrómos* - race under arms) in late 6th century BC in the Olympic Games' program[78]. It is obvious that these troops, stripped of armor for the sake of mobility, could not be positioned at the first rank(s). The first ranks were for the best and steadiest troops: the Spartans post there the winners of Olympic Games[79], the Thebans the Sacred Band[80]. These troops are most reliable, valuable and well-protected; not the best choice for mobile action and light gear. Consequently, there should be enough space between neighboring files for the *Ekdromoi* to spring out of order, emerge before the phalanx and conduct pursuit and skirmishing. This, in turn, leads us to assume open order for much of the advance of the phalanx(es) into contact. The same open order allowed light troops, skirmishing before the clash of the heavy infantry, to retire through the files of the phalanx[81]. After such transformation of the battle order, the phalanx could turn to close ranks by even-numbers of each file coming fore and left of their preceding odd numbers, doubling the density and halving the depth (*paragogé kat'epistátes*), or by simple *paragogé*; the latter was the second half of a file coming fore and left, aligning with the first half[82]. In both cases the front remains, the depth decreases, the density increases. If a general were confident for the drill level of his phalanx, he would wait for the last possible moment before closing the ranks, in order to keep his options open for any eventuality; if the authors' conception of the battle of Mantinea is correct,

76 SEKUNDA 2000; LUGINBILL 1994; KRENTZ 1985
77 XEN. HELL IV.5,16; 4,16
78 PAUS V.8,10; SNODGRASS 1967; EMANUEL 2012; SEKUNDA 1986 &1998 & 2000 & 2002
79 PLUT. LYC. XXII.4
80 PLUT. PEL. XIX
81 THUC. VI.69,2
82 CONNOLLY 2006; SEKUNDA 2000

perhaps he might have kept them open even after the last moment[83].

As the first ranks need armor more than any other, but they also have to execute the running charge to engage the opponent, an interesting solution developed at least since the end of the 5th century: the running charge was performed by a part of the phalanx, which would engage the enemy and deny missile fire with free field of view, but would content just to clash and then fight by spear-thrusts The rest, slower part, with heavier troops -in arms and in years- approached at a slower pace[84] and only after their arrival and coming into position the reformed phalanx proceeds to shoving, should the need be[85]. This is most probably what happened in Marathon and the logical apex of the running charge is reached by, and with, the creation of the *Ekdromoi*, the younger, fleetest hoplites trained to skirmish, pursue and charge[86] or follow a cavalry charge at a run.

At latest since the end of the 5th century Xenophon states that phalanxes deployed in line abreast are not the only way for a hoplite force to advance, nor to attack. In many cases the assault is carried out in great depth, were units are deeper than wide and form columns. These columns are either posted side by side to form a much more adaptable line, as when on march[87], or detached from each other, with wide gaps between them, to storm uphill against strongholds[88]. In the latter case, where the main weapon is still the spear, it becomes obvious that the hoplite kit was not invented for phalanx warfare, as this kind of engagement hardly qualifies as phalanx fighting. It was, though, within the troopers' skills, drill and practice. The formation and order are a bit tricky, and there might lie the quintessence of Xenophon's statement that the *Myrioi* (*mýrioi*) organised *ad hoc* six 100-strong *Lochoi (lóchoι)*, each divided to *Pentekostyes (pentēkostýes)* and *Enomoties*[89] *(enōmotíes)* - clearly following the Spartan binary standard[90], as the force included a whole Spartan regular regiment[91]; thus each echelon should have

83 Kambouris et al, 2015
84 Xen. Ages I.31
85 Goldsworthy 1997
86 Sekunda 1986
87 Xen. Anab. III.4,21-23
88 Xen. Anab. IV.8,9
89 Xen. Anab. III.4,21
90 Xen. Const. Lac XI.4
91 Xen. Anab. I.4,3

two lower ones. Moreover, he explicitly states that these *Lochoi* could be formed up, according to the tactical situation, by *lochoi* proper in straits, by *pentekostys (pentēkostýs)* in wider areas and by *enomotia (enōmotía)* in open terrain[92]. As each echelon comprises two of the lower ones, if all the *enomotiae* are in line abreast the formation is "by *enomotiae*". If the two *enomotiae* of each *pentekostys* are in line ahead but the *pentekostyes* of a *Lochos* in line abreast, it must be "by *pentekostyes*", and if all *enomotiae* are in line ahead, it must be "by *Lochos*". The term "*lóchoι órthioι*"[93] meaning "battalions in column" most probably implies the last of the above deployments; thus a *Lochos* covers the front of an *enomotia*. This successive transformation from line ahead to line abreast is the *paragogé*[94]. It is unclear whether these formations took into consideration the arrangements within the *enomotiae*; in Spartan armies of the day of Xenophon *enomotiae* could have a front of one, three or six men[95]. Whether a "battalion in column" had a standard front, or if this differed and was at the discretion of the commander, is unknown, but the second, more adaptable and less standardized option sounds preferable. This "battalions in column" deployment, with the *enomotia* deployed at its maximum width and minimum depth is peculiarly similar to a Roman Manipular Legion[96]. In reality, the only difference is that the Roman battalion, the *Cohort*, had three, not two sub-units (maniples); this tertiary structure possibly attributable to Alexander the Great[97], permitted posting one of the three maniples out-of-axis, producing the quincunx looks of the Roman army[98].

The charging columns, becoming renowned by Napoleonic infantry, were not new: a similar formation, the tower is known to the Greeks of Homer[99]. It is one's guess whether Epameinondas charging columns were in similar disposition, with deployed sub-units arranged in line ahead, or, as indicated by the number 50 of

92 Xen. Anab. III.4,22
93 Xen. Anab. IV.3,17
94 Arr. Tact XXVIII.1-3; Xen. Const. Lac XI.6
95 Xen. Const. Lac XI.4
96 Kambouris et al 2016
97 Arr. An. V.23,7 ; I.6,1 ; II.9,3-4
98 Plb XVIII. XXX
99 Hom. Il IV.334

the Theban ranks in Leuctra[100], he used sub-units in marching order (single file) arranged in line abreast, i.e. next to each other.

Kinetics

The main point of phalanx kinetics is to attain favorable dynamics at specific spatial and temporal parameters, especially if it found itself at a disadvantage or at a close match. The focal point was to exchange depth, density and length. Very deep formations, used for marching[101], should be able to transform to match ground and tactical conditions, or even weather. To deploy, meaning from a deep formation to transform to a wide one, there were three main ways[102]:

First way: To have each subunit formed at the minimal front in terms of number of men/files. Making the files as deep as possible, the front was shrunk and the density kept almost steady, thus allowing to negotiate straights and passages. This formation, a column rather than a phalanx, allowed prompt and cohesive movement to change the front and/or the face of deployment while adapting to the terrain and is similar to later column formations, as in Modern European warfare[103]. It also keeps a first line of the very best troops, which is advantageous for assaults[104]. It is, on both these grounds, the format used by Epameinondas in Leuctra[105] and perhaps in Mantinea and it could have been used in Tegyra also, as will be discussed shortly. In such occasion, a Spartan *enomotia* of the time of Xenophon would have a front of one man and a depth of 36 in normal conditions, producing a *Lochos* with a front of 4 men[106]. This approach might be the key for the Spartan flanking move at Nemea, 394 BC[107] and perhaps the move intended by the Spartans for achieving a flanking at Leuctra also[108] - although there is another possibility, see the third way. To deploy, the commanders of the subdivi-

100 Xen. Hell VI.4,12
101 Goldsworthy 1997; Luginbill 1994
102 Kambouris 2000
103 Goldsworthy 1997
104 Sekunda 2000
105 Xen. Hell VI.4,12
106 Xen. Const. Lac XI.4; Xen. Hell VI.4,12
107 Xen. Hell IV.2,22
108 Plut. Pel. XXIII

sions of the files, which are in line ahead within a single file, bring their men left and fore, in line abreast, thus increasing the width and/or the density and decreasing the depth. The Spartan *enomotia* of our example now has a front of 3 men and a depth of 12[109]. This case favors transformation from very long columns, as is order of march, to order of battle and the term might have been "*paragogé"*/ deployment. It allows either lengthening or condensing of the formation and also the direction of the front. The disadvantage is that it takes some time and dressing for the units to form to battle order, thus presenting a window of vulnerability.

Second way: A unit having its subunits deployed in line ahead (*epagogé*)[110]. Each subunit could be at any stage of deployment. In this way, fully deployed and ordered subunits could emerge at the sides of the leading one to cover an increase of the battle front, or to engage in a threatened sector. The term might be "*paragogé"* / Deployment by units. In this way, a Spartan *lochos* of the time of Xenophon[111] could have the front of a deployed enomotia (3 or 6 men) and be formed in four echelons. It is probably the deployment method of the six *ad hoc* formed *lochoi* during the March of the 10,000[112]. This is also the usual idea of what was Epameinondas formation in Mantinea, 362 BC and of the format of the republican Roman maniples, the centuries of which are thought to have been formed in line ahead and transformed to line abreast for the formation of a continuous line.

The front of each subunit was the normal one for set-piece battle, and, being already deployed, it could turn to face frontal threats at minimal notice and without window of vulnerability while forming up, as in the first case. Of course this approach could be combined with the previous, to allow for extra thin and deep deployment, as in the line of march in friendly territory, along roads. Tactically, though, they were mutually exclusive as they answered in different needs: the first to the need to change front fast, move fast and then deploy, while the second to the need to engage at an extended- although defined- front at a moment's notice with maximum security during the transformation. Moreover, the first case allows either widening the form or making denser the battle order, while the

109 CONNOLLY 2006
110 ARR. TACT. XXVIII.2
111 XEN. CONST. LAC XI.4
112 XEN. ANAB. III.4,22

second allows only widening of the front, specifically by means of forming a continuous front from a discontinuous one, a very useful drill when emerging from straights to wider terrain with the enemy in proximity.

The third way was to put whole parts of a deployed phalanx-not mere units, as in the second- at a second or third echelon, in *epagoge*[113]. It is somewhat similar to the previous case, in that the following echelons are ALREADY deployed, but with two extremely important differentiations: First, the units found in line ahead are not organically related- any two units could be found in line ahead, according to the width and depth of the formation chosen by the general. Second, the following echelons can only deployed to the flanks of the entire first line, thus extend an already fully formed and continuous line, not a discontinuous one as in the second way. This approach was followed to suddenly extend the front to envelop the enemy, possibly at both wings[114] by diminishing depth and keeping the density steady; its opposite was the *Anastrophe*, either to drastically shorten the front[115] or, more typically, to augment the depth and thus the solidity of the phalanx[116]. It is possible that this was the transformation attempted by the Spartans in the battle of Leuctra, to no avail[117].

Except changes in depth/width/density, it was essential to reverse front. None of the abovementioned methods could promptly about-face an army for dealing with an enemy emerging from the rear. About-facing each troop individually was easy, but this left the phalanx order inverted, with the ablest fighters last and the most experienced but not top performers, the veterans, first and exposed. A proper inversion of the phalanx was done by the countermarch/*Exeligmos (exeligmós)*, which presented the best troops against the new-found enemy, while keeping the same space or moving forward or backwards[118]. *Exeligmoi* though need open order and change the lateral disposition; this can also be fixed, but it is much more complicated[119].

113 Arr.Tact XXVIII.2
114 Pol. II.10,4
115 Xen. Hell VI.5,19
116 Xen. Hell VI.2,21
117 Plut. Pel. XXIII
118 Arr. Tact XXIII.1-4
119 Arr. Tact XXIII.5-XXIV

Seizing the initiative

Once a phalanx army is deployed and set for battle, the usual approach is to advance to make contact with the enemy; it is the *ephodos*[120]. Another is to stay put and expect the enemy advance. The usual choice was to advance, though, due to the beneficial psychological effect and to the momentum to the collision. While on the move, the troops of a file cannot be in contact and shove in a coordinated manner[121], as is dictated by the principles of *othismos*. Moreover, the ranks cannot be well-dressed. Thus, the least the number of files, the easier is the dressing of the ranks, which implies a deep deployment is preferable to maintain order. At the contact point, the first, or the first two ranks will eventually come to spear-thrust distance from the enemy and will attempt to fall their opposite numbers, using their momentum to add to the penetrative power of the spear and to the collision efficiency as they literally smash onto the enemy line[122].

Although the approach was at a fast pace but more or less leisurely, at the last tenths of meters the attacker might charge at a run (Fig 2), perhaps *Epidromi*[123]*(epidromḗ)*, to add momentum to their impact[124]. The distance of such charge varied[125], but standard training at the *hoplitodromos* indicated a stadium or so[126], to avoid massive archery[127] and this is the distance reported for the Theban charge at the double at the Battle of Koronea, 394BC[128]. Still, depending on the tactical situation and the field, the run might initiate upon sight, possibly for phychological reasons[129], but also to stun the opponent, to maximize surprise or close the window of vulnerability to missiles[130] and enemy countermaneuver. Alternatively, and as a standard, the run could evolve after proper advance at the

120 SEKUNDA 2000; HANSON 1999
121 GOLDSWORTHY 1997
122 GOLDSWORTHY 1997
123 SEKUNDA 2000
124 REY 2011
125 GOLDSWORTHY 1997
126 EMANUEL 2012
127 REY 2011, SEKUNDA 1998 & 2000 & 2002
128 XEN. HELL VII.2,22
129 LUGINBILL 1994; GOLDSWORTHY 1997
130 LUGINBILL 1994

moment thought opportune by the general, to produce impetus[131].

This "charge at a run" was very demanding to the front rank, as it destroyed dressing, order, cohesion[132] and thus any notion of collective action and support[133], while physically exhausting if executed in full armor and for any length of time/distance[134]. It did provide increased momentum to clash and thus rupture the enemy formation by sheer impetus[135], or at least to penetrate armor and shield with the spear extended, aimed and secured underarm at the last moment[136]. The momentum aimed at falling by spear-thrust or by physical impact through the shield the leading enemy ranks[137] and throw the following ranks into confusion fast enough so as the subsequent shoving or hand-to-hand fighting might start with an advantage and promptly disorganize and shatter any resistance. It also allowed crossing fast the field of fire of massed archery[138] and made difficult individually-aimed bow-shots.

A digression is needed: under this light, the events at Marathon may be seen and dissected a bit further: a brisk, energetic advance, the *ephodos,* was expected from a hoplite phalanx, which would then culminate in violent charge at a run. The *epidromi*[139]. If this was standard, what exactly was the novelty in Marathon? Perhaps this very procedure; it is well-known and standard, BUT our sources, especially Xenophon and Thucydides, and also Diodorus and the sum of the tacticians, refer clearly to later times when the practice might have become widespread[140]. The other possibility is that the novelty lied in that the advance altogether was executed at a run, and was thus much more exhausting, but also faster, stunning, surprising and confusing the enemy. And was thus possibly enacted by the younger troopers, while the veterans followed at a brisk pace or at a jog.

131 Hanson 1989; Luginbill 1994

132 Rey 2011; Sekunda 2000; Goldsworthy 1997

133 Xen. Hell VII.2,22

134 Sekunda 2000; Goldsworthy 1997; Luginbill 1994; Hanson 1989; Delbruck 1920; Emanuel 2012

135 Hanson 1989; Luginbill 1994

136 Sekunda 2000; Lazenby 1991; Goldsworthy 1997; Hanson 1999; Matthew 2012

137 Hanson 1989; Sekunda 2000

138 Luginbill 1994

139 Luginbill 1994; Lazenby 1991; Krentz 1985; Goldsworthy 1997; Sekunda 2002 & 2000 & 1998& 1986

140 Luginbill 1994

Once shield contact is made, if one of the two opposing file leaders does not fall due to the collision or spearing of the shock, shoving would ensue[141] with some opportunistic use of offensive weapons and CQC skill[142]. The hoplite has the rim of the shield firmly on his shoulder to take most of the weight and thus spare his arm[143]. The *porpax* (*pórpax*) central arm-band carries most of the weight of the shield to his lower arm and allows rough adjustment of the direction of the push[144], while the *antilabe (antilabḗ)* hand-grip, at the internal circumference or at the inside of the rim, allowed fine adjustments[145] and carriage of another weapon at the ready; the latter may be shafted, such as a spare spear or javelin[146] or not, such as the laconian dirk[147]. He adopts the "striding stance"; an oblique stance angled at the line of the front rather than standing with shoulders squared to the front[148]. This means that he leans forward on the left leg, right leg straight at the aft, thus presenting as small a target to his opposite number as possible and focusing the power with great efficiency (Fig 1). The next rank, upon arrival, put the convex bowl of their shields in the curves of the backs or sides of the front rankers, adjust the shield and their posture similarly, and add to the push[149]; and thus happens with successive ranks arriving (Fig 3). The pacing, which decides how fast they will be in pushing mode, the ability to combine, coordinate and synchronize so as to produce the optimum focusing of the collective weight, the number and the physical strength of the file members are all-important factors[150]; as is the valor, the resilience and the endurance, in order to stay concentrated in the shoving instead of minding the random stabs and hacks of the enemy, especially in the 2-3 first ranks[151].

Obviously, if shoving develops, the side which first achieves concentration of all its weight, from combining all the ranks of a file as man puts his shield at the

141 Hanson 1991 & 1989; Lazenby 1991; Rey 2011
142 Luginbill 1994
143 Connolly 2006; Hanson 1989 & 1991 & 1999; Luginbill 1994; Brouwers 2007
144 Snodgrass 1967; Hanson 1989 & 1991; Sekunda 1986 & 1998 & 2000; Brouwers 2007
145 Sekunda 1986 & 1998 & 2000; Snodgrass 1967; Anderson J. 1991; Stamatopoulou 2004
146 Anderson J. 1991
147 Sekunda 1998 & 2000
148 Luginbill 1994
149 Luginbill 1994; Goldsworthy 1997; Hanson 1989 & 1999
150 Luginbill 1994; Lazenby 1991; Hanson 1999
151 Goldsworthy 1997

Figure 3. The Chigi vase shows advance by rows and thrusting by the overhand grip, while spare shafted weapons are held, obviously by the left hand gripping the *antilabe*.

back of his preceding number[152], has a decisive advantage as it can rupture the enemy phalanx while still assembling its depth. In any case, if both sides were dense, one eventually gave way, perhaps at a single file's front, and this rupture quickly shattered the whole phalanx. The winning phalanx could shove and push to the ground the beaten hoplites and then finish off the rest of the broken phalanx, or spear and hack the broken troops as a moving juggernaut, with impunity[153], if only it does not lose its own cohesion[154]. In this way, it cannot give proper chase afterwards, which is the reason for the notorious Hoplite flights[155]. If a hoplite turned and fled, the chances for escape were very good[156]. To properly give chase, the winning phalanx had to break ranks too, but doing this, the fleeing enemy might decide, individually or collectively (Spartans used fake flights) to turn and fight at close quarters[157]. If this happened, it was down to

152 Hanson 1989 & 1991
153 Hanson 1999; Goldsworthy 1997
154 Lazenby 1991; Rey 2011
155 Krentz 1985; Hanson 1999; Rey 2011
156 Sekunda 2000; Hanson 1989
157 Hdt VII.211

personal equipment and prowess, coupled to the psychology and the numbers (the latter two favoring the winning side, as the retreating troops move away from the fray, whereas winners were coming towards the fray). Casualties or even reversal of the verdict of the battle might ensue, and the Spartans did not give proper chase[158] in order to avoid breaking their formation and expose their men to the random hack or to a reformed enemy, catching them out of order or in loose order[159].

But a conclusive shoving was not the only reason for CQC. If the clashing phalanxes are not dense enough, collective shoving cannot develop and after the clash and some pushing, hand-to hand combat will ensue to decide the outcome, as front troops intermingle[160]. In this case training and equipment, both overseen by the state[161] but also of private concern[162], ruled supreme[163], as happened at Nemea between the Thespians and Palleneans, in 394 BC[164].

A third option was the slow, orderly Spartan advance under the flute[165], something between the former two. It adds no momentum to the stabbing or clashing but retains the initiative and as it maintains order[166] it allows very prompt concentration of the collective pressure to the first rankers, thus giving an instant shoving over-push, similar to the one of static formations. This immediate shoving was able to break at once the advancing or charging enemy (and their spear-shafts) before said enemy were coordinated and set for shoving- and this if they had endured the Spartan spearing, which was much more effective, as the troops were well-dressed by rank, near each other by file and slow moving, thus being able to aim better[167].

Forfeiting/Having lost the initiative

If a deployed phalanx perceives its opponent incoming, there are two choices:

158 PLUT. LYC XXII.5
159 LUGINBILL 1994
160 GOLDSWORTHY 1997
161 SNODGRASS 1967; LAZENBY 1991
162 KRENTZ 1985; SEKUNDA 2000; ANDERSON J. 1991
163 SEKUNDA 1998 & 2000
164 XEN. HELL IV.2,20
165 PLUT. LYC XXII.3
166 REY 2011
167 SEKUNDA 2000

remaining still, to receive the attack as a solid body, immobile and well-dressed[168], or counter-charging to meet the enemy head-on[169]. The first option should, but not necessarily must, be coupled with a strong position, and/or maximum density[170]. A "strong position" may simply imply the inability of the adversary to flank or outmaneuver the defensive force, or to bypass it towards access to vulnerable areas of the defended territory[171]; or it may account to degrading the enemy aggressiveness by uphill or other contested approach parameters. But this choice means giving up/ forfeiting the initiative AND being deprived of/ denouncing the momentum (*élan*) of the forward motion, which renders the first spear-thrust upon contact most powerful and penetrative; it also gives up/ denounces any psychological impetus of aggressiveness and action for a passive, solid mode. So why choose it? Being firmly at the ground, a phalanx could produce maximum density between files, with shields overlapping as it did not need leeway for moving. The ranks could also be perfectly dressed and very close to each other, ready to shove. In this way the phalanx presented a metal fortress, impervious to missile fire, undaunted by cavalry and well-protected from stabbing, as the shields were in the best possible formation and angle. Enemies may be staked by their own momentum onto the projecting spears. And, most important, this rock-dense phalanx was ready to shove at once at full power, against an enemy who arrived piecemeal, thus creating an over-push which could decide the encounter at once[172]. Even the best hoplite armies denied an advance against a competently set solid phalanx[173]. The Athenians who, full of fervor, did engage uphill at Delion in 424 BC, suffered a catastrophic loss[174].

Moreover, it is possible that a general does not trust his troops' drill or mettle. The static defense is best for low morale, as it discourages desertion and needs not the same level of determination and resolve. Furthermore, the dynamics of collision are complicated by definition, as will be discussed shortly. Thus, by doing away with all need for transformations, timing, issuing orders and execu-

168 Xen. Hell VII.4,22
169 Xen. Hell IV.3,17
170 Hanson 1989
171 Thuc. V.65,1
172 Xen. Hell VII.4,22-23
173 Thuc. V.65,2-3
174 Thuc. V. 96,1-8

tion, the commander might use some strengths of his host, such as numbers or resilience and endurance, or even good equipment and carefully selected positions to wrestle a victory from more capable opponents[175]. Thus, at least two occasions are known where Spartans, under very competent generals, shirk contact with immobile, static opponents holding advantageous ground[176].

The counter-charge is the usual response, though[177]. It is the most difficult to execute properly, and this is the reason for the continuous strings of victories of better trained, or better motivated troops: that it negates any advantage to the weak. The counter-charge means that all issues described herein interplay with the mind game of the opposing generals. If a counter-charge is at a pace, actually counter-advance (*antéphodos*) whereas the enemy charge proceeds at the double (*epidromé*), it is very likely the counter-charging phalanx intends to stop to a stand, at the last minute, transforming to higher density in order to augment its stability and cohesion and increase its advantage when the enemy would be too committed to counteract[178]. Or it may burst at the double as well (*antepidromé*), to catch the enemy out of breath[179]; but in the latter case if it is not perfectly timed so as to build momentum, it will clash with the utter disadvantage: open, unsteady and low on impetus[180]. Similar issues plight all other combinations of actions and reactions. The former case is also tricky: if the transformation is not complete before contact, that is if not perfectly executed and timed, disaster follows, as might have happened in Leuctra 371 BC[181]. If the enemy charge is at the usual, brisk pace, it is open to debate whether it will continue so all the way to contact, or if it will end with a running charge which undermines order and dressing of the phalanx and offers an opening to an opponent able to couple good order with resilience.

175 DIOD. XV.32,5-6
176 THUC. V.65,2-3; DIOD. XV.32,5-6
177 GOLDSWORTHY 1997; HANSON 1989
178 LUGINBILL 1994
179 XEN. HELL VII.2,22
180 GOLDSWORTHY 1997; LUGINBILL 1994
181 XEN. HELL VI.4,13

Phases of the struggle

The collective phases were practically two: One was the spearing and stabbing over and beneath the shields, upon contact[182]. In these cases, the neck, the face, the thigh and the groin were the primary targets[183]. In this phase the sword was a secondary weapon[184], possibly a thrusting substitute for a broken spear[185], but also useful for hacking high, over the shield-wall at the head, especially when a sabre (*kopís*) was used[186]. The second was the collective shoving. It was not necessary to have both in any given battle, but the spearing was perhaps indispensable. If a shoving match developed, the use of offensive arms was becoming problematic due to spatial constraints[187]. But it was also decisive, since the best troops of the enemy were within range and losses destabilized the whole phalanx, which literally leans on them: thus the Spartans shrank their swords to dirks[188] for this specific reason at the end of the 5th century, electing only brisk thrusting phase with spear and going quickly to shoving where their training in coordination was most telling, but also their dirks offered unfair advantage. As the shoving needs a coordinated effort, stabbing some of the foremost opponents-even if not mortally- throws the rest out of focus and may bring a decisive result, quite out of proportion to the body-count.

Still, shoving might have not occurred. The stabbing phase might have decided the issue at once or become prolonged. Even if the two sides had come into close quarters, either by charge or progressively by spearing and advancing, the exchange of blows between opposing phalanxes could devolve to individual fighting with broken ranks instead of shoving- or after shoving[189]. This phase was most probable if the clash happens in open order mode and favors the sword[190] and the best armored and more extensively trained troops, although if the best

182 Rey 2011

183 Goldsworthy 1997; Anderson J. 1991; Luginbill 1994; Sekunda 2000 & 1998; Snodgrass 1967; Hanson 1999; Matthew 2012

184 Brouwers 2007

185 Anderson J. 1991; Hanson 1991

186 Snodgrass 1967; Anderson J. 1991

187 Goldsworthy 1997

188 Hanson 1989; Sekunda 1998

189 Sekunda 1998 & 2000; Goldsworthy 1997

190 Plut. Tim. XXVIII

equipment does not lie with the best trained side, things get unpredictable.

It is clear that a phalanx well-dressed, coordinated and cohesive had a decisive advantage in shoving and might make up for disadvantages in numbers, weaponry and even individual training and valor[191]. To achieve this, rank and file should be dense and break the enemy not only before the opposite happens, but also before any asymmetrical counteraction could be implemented (such as flanking attack) and without devolving to single combat. Training for the shoving match could be provided in the form of festivities and public events promoting rhythm, such as dance[192], team-building activities promoting collectiveness and coordination[193], such as gymnastics, hunting and every stamina and strength-building exercise or work. It is understandable, though, that the first rank of a phalanx shoving brilliantly as it might, the collective potential was fully developed when all ranks were in contact and pushed together and achieved focus of their effort to the shields of the file leaders[194]. Thus, if a phalanx reached shoving distance after an advance, its full potential would take some time to develop, as successive ranks arrived and had the backs (literally) of their previous numbers and started pushing them with the shields[195].

This is the critical point; when two phalanxes were clashing (if it had come to the clash) all previous results were null: the side winning the shoving is the victor, no matter what happened in missile and thrust exchange. And the winner of the shoving would be the one who would be the first to bring the most pressure to focus on the shields of the first rank[196].

This simple fact means that the file leaders were the neediest for armor[197], so as to survive and allow the phalanx to enter the shoving phase with integrity, i.e. without weak points developing by killed/stabbed troops, casualties that mar the order and the morale and shake the formation- a very dangerous proposition as the victory goes to the more orderly phalanx[198]. It also means that densely packed

191 Rey 2011
192 Krentz 1985; Anderson J. 1991; Sekunda 2000
193 Xen. Const. Lac. IX.5
194 Lazenby 1991
195 Hanson 1989; Goldsworthy 1997
196 Hanson 1989 & 1991
197 Krentz 1985
198 Luginbill 1994; Lazenby 1991

phalanx had an advantage, as its first rank was better covered with the shield-wall and more survivable and brought on more pressure. But it also becomes evident that the final advantage lied with the side able to muster speedily all its ranks to produce maximum pressure[199]. Troops able to coordinate with each other increased the pressure exercised by a given depth and density, and this is the reason for the laborious, protracted, continuous collective Spartan training and rehearsals: to enable optimum participation of every hoplite in spatiotemporal and energetic terms. It is also the reason for the largely ignored necessity in hoplite armies to find oneself into his assigned position, with his assigned comrades: they were trained together and had learnt to cooperate and coordinate optimally[200]. The Spartans, on the other hand, could coordinate and produce the optimal result even if posted near complete strangers, provided only they were Spartans as well[201].

Spartan reflections

The Sparta projected by Thucydides and Xenophon was a shade of the Glory of the Persian Wars, mainly due to the massive loss of life of the earthquake of 464 BC and the resulting Helot insurgency[202]. With regular troops in short supply, other parts of the population were armed, trained and drafted into the phalanx. The distrust towards them, along with a financial decline due to a prolonged and destructive state of war had reduced the available armor and diminished the individual training for CQC, both issues prone to misuse by the less trustworthy elements of the new military. Thus, decision of a battle at the phases where exchange tells and numbers, weaponry and personal virtue decide the issue[203] should have been avoided. The solution was to go for a decision by shoving, thus avoiding casualties before and uncertainty after. The whole training scheme of *agogé* instilled discipline, cooperation, coordination, every possible skill and attribute to allow maximization of the pressure the limited manpower of Sparta

199 Goldsworthy 1997; Krentz 1985
200 Lazenby 1991; Wheeler 2008
201 Xen. Const. Lac. XI.7; Plut. Pel. XXIII
202 Diod. XV.66,4; Plut. Lyc. XXIX.6
203 Krentz 1985; Anderson J. 1991

could bring down to the enemy[204]. The effort was by no means straightforward only: the new, very short sword[205] allowed expertise in stabbing within the constraints of the shoving[206], thus undermining the shoving effort of the enemy first rank. Although whatever had happened before the shoving had no direct impact on it, it did have indirect: the loss of file leaders caused confusion, drop of morale and order, creation of weak spots in the phalanx[207]. Moreover, once shoving had begun, any mishap, such as the destabilization and repulse of some enemy ranks and/or files impaired the concerted effort of the phalanx and spelled defeat for the sufferer.

Consequently, the Spartans advanced in a special way: slow, orderly, perfectly dressed and to the tune of flutes, most probably marching in step[208] so as to maintain order and advance as one solid body[209], with minimal distance needed between successive ranks. In this way they could move and maneuver, so as to engage the enemy the way they judged suitable, in order to achieve an advantage (as is a flanking opportunity), but they could also consolidate fast to a single body for effective shoving; much faster than their opponent, no matter whether the latter simply advanced or charged at the double; the Spartan motion would enforce shoving over thrusting and the Spartans would consolidate much faster, dislodging the first or even the first few ranks of the enemy as they come into contact by shoving them out of balance before the enemy phalanx is amassed. Thus a speedy decision is achieved locally, but the tear is transmitted throughout the enemy phalanx, resulting in final victory- with one exception. A phalanx big enough, and /or diverse enough, might not shutter all at once and the destabilization due to a local break might be contained[210]. In such cases, maneuvering can press decisive advantages home, such as flanking positions[211].

From the above, is clear that a balance of different factors should be struck so as to ensure the success of a phalanx army in a symmetric battle; similar or dif-

204 Sekunda 1998
205 Plut. Lyc. XIX.2
206 Sekunda 1998; Goldsworthy 1997
207 Goldsworthy 1997; Krentz 1985
208 Lazenby 1991; Goldsworthy 1997; Wheeler 2008
209 Plut. Lyc. XXII.3
210 Xen. Hell IV.3.18
211 Xen. Hell IV.2,20-21

ferent considerations apply in asymmetric confrontation, too. The abilities to come to grips fast and in good order[212] and to transform for maximizing density or depth[213] was crucial: if both phalanxes advance against each other, maximum density gives an advantage when spearing and shoving between the first few ranks of the antagonists at most[214]. Great depth decides the issue if things go to fully developed shoving[215]. A longer line, of course, offers the opportunity to outflank an opponent[216]. All these are dynamic issues in a spatio-temporal context; the rapidity and extend of a local success and its impact may nullify a reverse at a different point[217]. This is why in phalanx warfare numbers WERE of essence and no reserves were kept: they were needed to deepen or extend the phalanx, which, if broken, or turned, could not be restored by reserves[218].

Historical paradigms of imaginative use of hoplite mechanics

Open order, which favors collective maneuvering and individual motion (in terms of running, dodging, parrying etc), also allows better missile casting, thrusting and CQC. In this light, three very famous battles are instructive:

1. Near Mantinea 418 BC, the advancing Spartans detected the enemy alliance phalanx on a slope, standing and not moving to (counter) charge. The slow paced Spartans would come into contact and progressively they would apply the formidable pressure they were famous for, as their ranks were dressed and very close to each other. But the enemy was static, and this means they were in shoving mode already. The Spartan king was persuaded not to risk a shoving match with a disadvantage and retired speedily, tempting the enemy to the flat ground. The next day, although the prompt enemy advance over the flat surprised the Spartans, they formed up fast, they advanced slowly and repelled the charging opponents in front of them, while subsequently maneuvering to cope with the parts of the enemy phalanx that had emerged temporarily victorious by surging

212 Goldsworthy 1997
213 Luginbill 1994
214 Luginbill 1994; Goldsworthy 1997
215 Luginbill 1994
216 Luginbill 1994; Krentz 1985
217 Xen. Hell IV.2,20-21
218 Anderson J 1991; Hanson 1991 & 1999

through a gap and disintegrating two Spartan divisions[219].

2. Near Tegyra, in 377 BC, two Spartan Morae came upon the Theban Sacred Band and some cavalry[220]. The Spartans had both Polemarchs (*polémarchoι*) positioned at the center, with their elite troops (*ibid*), obviously practicing the formation with the first Mora inverted[221]. This could be achieved by inverting to order of march and then by leftward deployment to line of battle[222]; or by marching the one Mora at a semicircle and then perform a standard Laconian countermarch by file[223], which is the most probable and reminding the -too abstract- description of Xenophon[224]; or by simply having the Mora countermarching horizontally in the Cretan way[225]. The Thebans charged by horse and attacked on the run with the Sacred Band ordered in depth, obviously concentrating a very narrow front, thus passing from thrusting to single combat. This event allowed them to pierce the Spartan phalanx, which opened up to let the Thebans through, at the same time stabbing them at their right flank.

This was by no means novel; it had occurred in 394 BC in the battle of Nemea[226] and Agesilaus was criticized for not doing the same at the battle of Koronea the very same year [227]. The turning point was that in Tegyra the leading Thebans, once through, turned against the inner Spartan flanks and perhaps the Spartan rear also, thus collapsing serially the whole Spartan phalanx[228], with the cavalry giving chase[229]. Thus, a narrow front in great depth could cut through a well-ordered phalanx in standard density (in high density the result was different, as shown by the Arcadian victory over Spartans)[230], if pressure was applied instantly and without shoving, where coordination is important. The use of both these features, the narrow front and the flank attack at the inner flanks created by

219 Thuc. V.67-73
220 Plut. Pel. XVII
221 Xen. Const. Lac. XIII,6
222 Xen. Const. Lac. XI.8-10
223 Arr. Tact. XXIV.2
224 Xen. Const. Lac. XIII,6
225 Arr. Tact. XXIII.3-5
226 Xen. Hell IV.2,22
227 Xen. Hell IV.3,19
228 Hanson 1989
229 Plut. Pel. XVII
230 Xen. Hell VII.4,23

the burst through the enemy phalanx appear in Mantinea, 362 BC[231]; the death of Epameinondas, though, deprived the victors from the orders to redeploy promptly and exposed them to flanking, thus leading the battle to a draw[232].

3. At Leuctra, 371 BC, the advancing Spartans, posted at the right wing of the allied army, were drawn 12-deep, possibly intending to go 6-deep just before contact, or intending to maneuver to flanking position. The Thebans advanced rapidly under cover of a cavalry screen their 50-deep formation[233] at the extreme left wing, going for a head-to-head clash with the Spartans. In two previous cases deep Theban contingents had broken through parts of Spartan-led phalanxes, but were ultimately defeated. The Spartans in both cases had performed even better, thoroughly shattering allies of the Thebans and catching the latter dispersed, in hot pursuit or in the man-to-man melee. Contrarily, the Spartan phalanx had been kept intact, true to their obsession not to break formation, obviously dictated for similar eventualities. Both battles were fought in 394 BC, the one at Nemea[234], the other in Koronea[235]. Against the Athenians, 30 years earlier, in Delion 424 BC, the Thebans had fared better: they kept order after destroying the enemy left wing[236], whereas the Athenian victorious right wing broke ranks to envelope the rest of the Boeotian contingents[237], and thus exposed itself to counterattack by cavalry reserves and the well-ordered Theban hoplite contingent[238].

The Spartan discipline, drill and maneuverability being vastly superior to theirs, the Thebans at Leuctra had to attempt a direct confrontation using brutal force and negating maneuvering. The usual presumption is that both armies at Leuctra had the same density but this may not have been so: as the Thebans were less well-trained and moving at the double, they might have been in open order, while charging at a run, and after impact they might have closed ranks to increase the density to maximum[239] by executing *paragogé*. This agrees with the fact that

231 Xen. Hell VII.5,23
232 Xen. Hell VII.5,25
233 Xen. Hell VI.4,12-13
234 Xen. Hell IV.2,20
235 Xen. Hell IV.3,17
236 Thuc. IV.96,7
237 Thuc. IV. 96,3
238 Thuc. IV. 96,6
239 Diod. XV.55,4

deep phalanx formations have low density[240]. So, at the moment of the impact the Spartans were denser (their steady pace allowed close order while advancing) and more compact, although it is possible that Pelopidas engaged the Spartan formation while the latter was extending the wing to try to counter Epameinondas' charge by enveloping the exposed flank[241]. It could be exactly the opposite, however: The Spartans trying to perform *Anastrophe*[242] to increase their depth by shortening the front. The wording of Xenophon, on the other hand, might imply that the commotion was due to their effort -or inability-to receive their beaten cavalry[243]. In any case, the Theban assault was swift, which is incompatible with a shoving match. At the beginning the Thebans caused numerous casualties to the Spartans, a clear indication of thrusting, but were eventually repulsed if not thrown back as the Spartans were readily in shoving mode -or at least, consolidated faster than the Thebans. Probably this is the meaning of Xenophon[244] when stating the recovery of the Spartan King's body. To gain time for their full depth to come into play and perhaps even close the ranks to increase the density (by going to 25-deep, they were still double depth than the Spartans), the Theban file leaders were instructed not to content to spearing/ shoving the Spartans upon contact but to come to grips and wrestle them out of order, to the ground[245]. This produced disarray enough among the Spartans for the Thebans to form in shoving mode and break the Spartan line with shoving, as reported by Polyaenus with the proverbial request of Epameinondas to his troops "Give me one more step"[246].

Weapons drill and individual combat skills

Phalanx fighting has, as mentioned before, more dimensions than the shoving and clashing by means of the Argive shield[247]. The spearing is most important, so important that the spear became the weapon "par excellence" of the Hoplite era.

240 XEN. CONST. LAC. XI.6
241 PLUT. PEL. XXIII
242 XEN. HELL VI.2,21
243 XEN. HELL VI.4,13
244 IBID
245 PLUT. QUAES. CONV 639F
246 POLY. STRAT. II.3,2
247 KRENTZ 1985

"Conquered by the spear"[248] was the proverbial expression, and the Battle of Plataea was won by "the Dorian Spear"[249].

The hoplite spear of the classical era had a warhead, mostly of iron or steel, but occasionally or bronze as well, and a butt-spike (*saurōtér*) of copper for planting into the ground so as the warhead wasn't exposed to dampness and getting rusty[250]. The butt-spike was an effective counterweight, but also a spare warhead if the shaft shattered, with longer reach than the sword[251].

The main striking/thrusting technique was the overhand thrust[252]: the spear was held by the right hand raised to head-level at a slant (Fig 4), warhead pointing low fore and butt-spike backwards and upwards. This way the thrust could be aimed, ideally, over and behind the shield of the enemy or the shield-wall of the enemy phalanx, and delivered downwards at the throat and torso[253] with great impetus, to pierce body armor, as the weight of the body enhances the thrusting power of hand, arm and chest. At the same time the retrieving motion, directed high up, posed no danger for the following ranks. Still, this overhand grip was doable for a very limited time, being especially awkward when moving; perhaps for just a few strides or paces before contact. For advance or charge, or even for a wait, it was nightmarish and other grips should have been used, which were less demanding and more comfortable. The problem is that when the spear had to be raised, the transition from a grip to another might always pose a danger to the ranks behind, especially when armor had already been discarded in phalanx fighting. And the situation was worse the denser the formation[254]. It is possible that a transition from the low grip to the overhand one was possible without any lateral motion of the shaft, by playing the fingers around it- as shown in repetitive drill exercises with the *Koryvantes Association of Historical Studies*. This needs a lot of practice at home and on the drill-ground, but is actually easier than most modern weapons drill, and the thong at the handle of the spear[255] was a great

248 Soph. Aj. 211
249 Aesch. Pers. 817
250 Sekunda 2000 & 1998 & 1986; Anderson J. 1991; Snodgrass 1967; Connolly 2006
251 Hanson 1989 & 1991
252 Anderson J. 1991; Lazenby 1991; Hanson 1989
253 Anderson J. 1991; Lazenby 1991
254 Goldsworthy 1997
255 occasionally misinterpreted as a throwing loop, i.e. Snodgrass 1967; Anderson J. 1991

Figure 4 The overhand and underhand spear thrusts. The hoplite at the right backstepped to shirk the full-power downward thrust aiming at throat/upper torso and uses the shield to deflect the residual thrust, while aiming the thigh and groin. Such sequences were taught by *Hoplomachoi*. Courtesy: Association of Historical Studies "KORYVANTES"

help in both confidence and execution, as it kept the shaft nearby even if bloody, strained or sweaty fingers had difficulty to grasp it firmly. This method, of changing the grip is much plainer and less risky than jogglerish throwing of the spear to the air to change the orientation of the hand, or planting it to the ground (while advancing or fighting!) as occasionally suggested[256].

It is difficult to achieve normal pacing if the phalanx is in dense formation, or engaged in shoving. The same goes for some cases of CQC engagements and possibly for thrusting matches too, where cover under shield should remain undisturbed by the motion of the waist. So, the presumption in favor of galloping (hind leg moving fore and fore leg sliding forwards, without legs ever crossing and waist changing direction) instead of striding steps (hind leg crossing and

256 MATTHEW 2012; ANDERSON J. 1991

passing in front, waist turning 90 degrees or remaining steady dead ahead) is not unwarranted.

Similarly, the overhand thrust was perfectly applicable from a dense, steady formation and a bit more challenging from an advancing formation, but utterly unpractical for troops charging at the double. Not only aiming was difficult and the center of gravity moved high, spelling a disadvantage at the clash or shove but, while running, the raised hand slows the runner down, is tiresome and an exposed target in missile hail. Things are little better with hand down at shoulder level, to rise at the last stride or two: the rising made the butt-spike as dangerous for the following rank as the warhead for the enemy troops. The only practical solution was the low (underhand) grip, if holding the spear at a slant (Fig 5), which affords free motion while running. Near the enemy the spear was leveled, either dead low/underhand to permit a stabbing thrust to thigh, loin and calf (aided by the convex of the shield that deflected angled thrusts) or firmly held underarm to burst through the shield-wall at the joints or even pierce a shield and armor[257].

What is rarely, if ever, observed, is that there are at least two sizes of hoplite shield, the one much more concave and wide than the other; this wider shield is advantageous in shoving and spearing, while the smaller shield is much handier in CQC and skirmishing/ mobile tactics and might correspond to the *aspidiskos* (*aspidískos*) of certain inventories[258]. During the advance, a phalanx in larger shields had a distinctive advantage over another with smaller, as the former may stab low, where their opponents would have been unprotected if they were holding the shield for torso protection and shoving action. Of course it is conceivable that the selection of shield might be individual or, for state-issued shields[259], according to the role of a hoplite: a young hoplite would be issued the small shield to act as *Ekdromos*, a seasoned warrior fighting at the first ranks would have a large shield for performing shoving and spearing with better prospects of success and survival[260].

So, for good thrusting action, the formation must not be very dense, thus eas-

257 Snodgrass 1967; Hanson 1989; Anderson J. 1991; Matthew 2012; Sekunda 2000
258 Sekunda 2000
259 Sekunda 2000
260 Krentz 1985; Goldsworthy 1997

ing all kind of spear movements as it allows a wide angle of aiming[261] without threatening following ranks with the buttspikes. The latter was a special concern in underhand hold as occasionally suggested[262] and with unarmored troops.

The other phase where offensive weaponry was cherished was after spearing and possibly after shoving, when the formations were broken and the fighting was hand-to-hand in a melee[263]. In this situation spear-thrusts were still applicable and more prone to expertise. At the same time the shield could be used imaginatively in both offensive and defensive manner[264], but the sword, straight or curved, reigned supreme[265]. Such weapons skills were much more elaborate than the basic ones needed for spearing and shoving and the basic drill afforded by communal practices such as dance and gymnastics, which endowed basic attributes such as agility and strength and taught basic moves of dodging, parrying and attacking[266]. For this higher level of proficiency there were weapons instructors (*hoplomáchoi*) teaching weapons expertise for a price[267]. Standing parts of state armies (*Logades* of Argos, *Eparitoi* of Arcadia, *Epilektoi* of Phlious)[268] were better versed in these skills, the same way they were far better in terms of coordination in phalanx warfare. Such skills were distrusted by traditionalists: Plato has both generals (Laches) and civic figures (Socrates) being skeptical or outright unimpressed; the distrust of the Athenian philosopher to such practice is given but the fact that "the weapons instructors (*hoplomáchoi*) do not set foot at Sparta"[269] has dual meaning: The obvious is that troops feeling comfortable in hand-to-hand combat, which was taught for a price[270] may be less willing to face the random thrust or hack of orderly phalanx fighting and opt for coming to grips, thus undermining the collective and egalitarian phases of the phalanx warfare, the spearing and shoving[271]. This in turn exposes to the risk of open fighting

261 KRENTZ 1985; GOLDSWORTHY 1997
262 GOLDSWORTHY 1997; MATTHEW 2012
263 LUGINBILL 1994
264 LUGINBILL 1994; GOLDSWORTHY 1997
265 KRENTZ 1985; SEKUNDA 1998 & 2000
266 KRENTZ 1985
267 SEKUNDA 2000 & 1998; ANDERSON J. 1991; KRENTZ 1985
268 THUC. V.67,2; XEN. HELL VII.4,34 & VII.2,10
269 PLAT. LACH. 183B
270 SEKUNDA 2000
271 SEKUNDA 1998

Figure 5. A running charge/*epidromi* uphill, showing the hoplite spear held underhand and underarm. Courtesy: Association of Historical Studies "KORYVANTES"

the less well-to-do and thus ill-trained for such eventualities citizens and comrades and mars the order vital for the phalanx[272]. But this is one reading. The other is that the Spartans had nothing to learn from such masters[273], and, one may assume, much to fear from their watchful and expert eyes. Even at the dubious Spartan socioeconomic status of the era, there are indications pointing at weapons drill and expertise[274]. The proverbially short laconic sword was efficient nonetheless and the Spartan officials always supported it[275]. Its limited reach, complained upon by Spartans proper[276] indicated intimacy with CQC and congested conditions where intuitive moves are less applicable[277].

272 Anderson J. 1991
273 Krentz 1985
274 Krentz 1985
275 Plut. Lyc. XIX.2
276 Plut. Apoph.69.18
277 Hanson 1991; Anderson J. 1991; Goldsworthy 1997

Conclusion

From the above it becomes obvious that tactical choices and the promptness of execution of transformations might turn one phalanx at a disadvantage at the moment of contact. Experienced troopers might see or even perceive it and understand, at the last moment, the oncoming disaster without any chance for countering. This is perhaps the real reason for the disintegrating of phalanxes just before clashing with the opponent[278]; the obvious dynamics, not the lack of mettle, made seasoned or less seasoned, but solid enough troops who stood at the sight of the enemy and marched against him, to suddenly lose heart and break with hardly any blow -or, rather, thrust-exchanged, as with the stout Arcadians in the "tearless battle"[279]. The successful generalship was to position (*tattein*, thus tactics) the troops at the correct spot according to their number and skill, to adapt density, width and depth of the phalanx, to select attack or defense and, in case of the former, the attack mode, its promptness, target and precise timing, and to transform the phalanx promptly in depth and speed of motion as the moment called and according to the drill level and discipline. The perplexity of such duties was great; according to Xenophon, a student of Socrates, with military career ambitions, was too surprised when he understood the sheer volume and complexity of such knowledge never taught by the well-paid tactician whose lectures focused on the different orders of battle ignoring other useful aspects of generalship, such as logistics, morale, conscription drafting, motivation etc.. [280]

278 LAZENBY 1991; HANSON 1989

279 XEN. HELL VII.1,31

280 XEN. MEM. III.1,5-11

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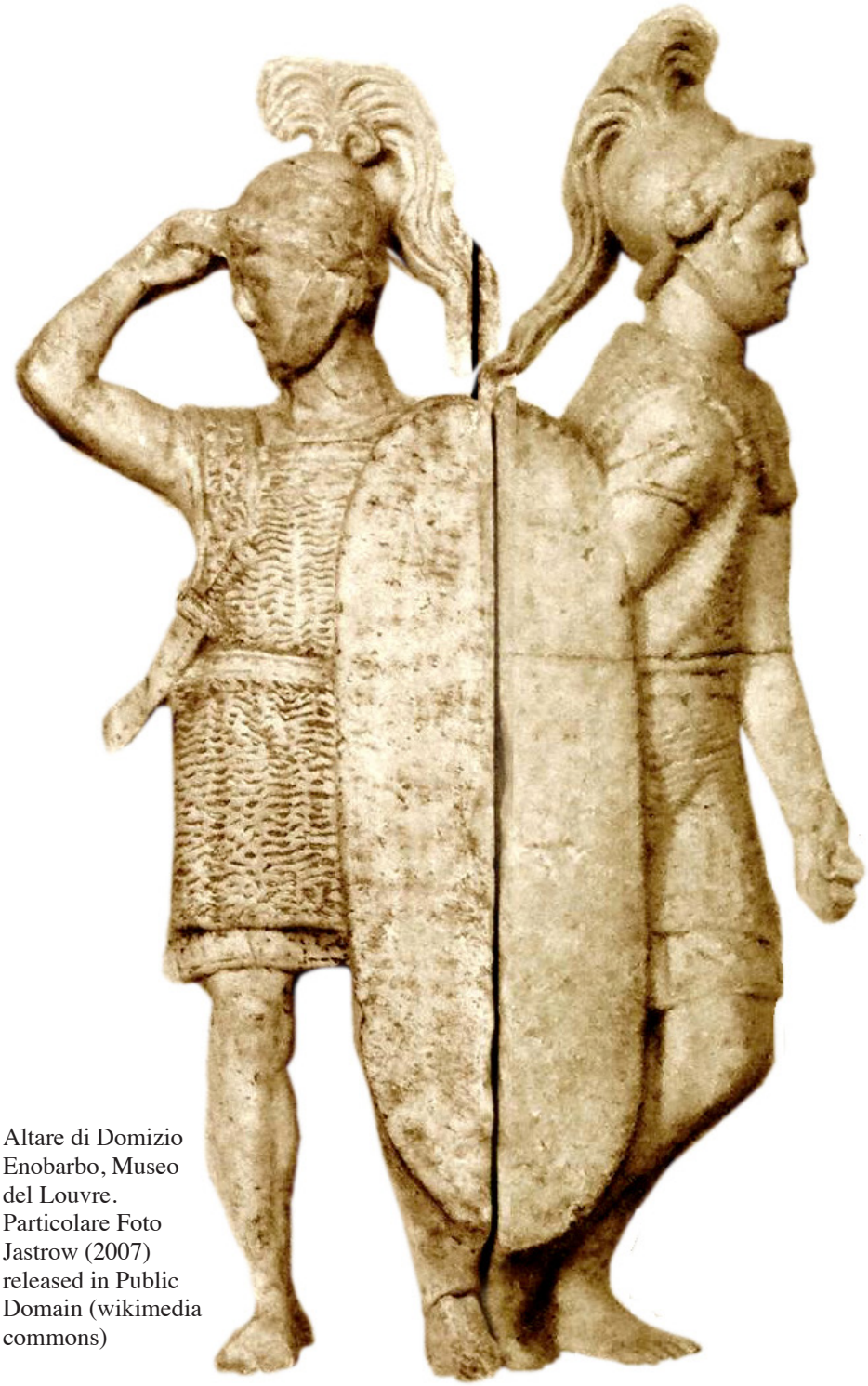

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