



# Officer academy

## 1: Battle formations

Vít Hrachový <http://kastilie1312.cz> - <http://facebook.com/kastilie1312> Mar 11. 2025  
Illustrations: Tomáš Zach

# Contents

- Formations theory.
- Formation exercises how to.
- Weapon reach.
- Q/A.





# Formations theory

- Goal:  
Maximize enemy losses.  
**Minimize own losses.**
- Without people to lead, officer is just a man.
- Battle formation: **Tool** to get advantage.
  - Allows defeating numerically stronger enemy.
  - Adapts to terrain, numbers and weapons of both sides.
  - Plain open space leads often to victory of numerically stronger side.
  - Battle field with obstacles can prevent the advantage of numerically stronger side.
- Main target:
  - **Gain reach (or firing range) for own troops.**
  - **Reduce reach for enemy troops.**
- **Reach, initiative, speed and cooperation** are key factors.

# Formations theory: Key factors

- **Reach**

- Opens path to (local) numerical advantage.
- Reduces number of active enemy troops.
  - Terrain, obstacles, weapons length and firing range...

- **Initiative** = Decision making

- Who wins initiative, decides about when, where and what happens on the field.
- Can prepare situation to his own advantage.
- Initiative != aggressivity. Even if it may look like.

- **Speed** and **cooperation**, fighting against numerical superiority

- We exercise hitting together in 1 time, 3-5 against one.
- Uneven fight conditions force us to utilize reach and initiative.
- Initiative + powerplay build tactical skills.

- Fighting requires **mobility** and ability to **quickly react on change**.

- Decision making at small groups level, local officers, sergeants.

# Formations: Rank, Wall

- **Rank. (Czech: Linie. Řada)**

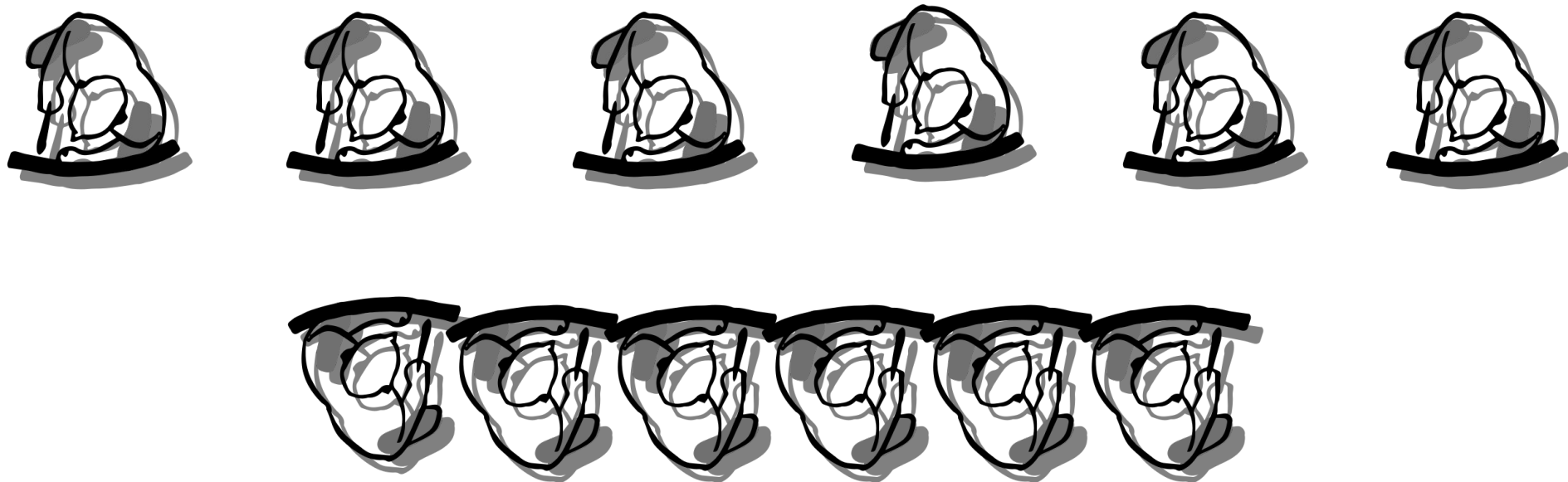
- Max spacing: Extending right arm to touch left shoulder to the right, reach right shoulder to the front.
- Min. spacing at elbow reach to right. Dodging is affected.
- **Gap** affects **REACH** of team members. How many of us reach to help together.
- +Gap provides enough place to dodge incoming attacks to left, right, and back. I still occupy my place.
- +Gaps can be used to rotate back troops to front.
- +Gaps can be used by archers and spearmen in direct and diagonal angles. Reach: 3 to 1, 5 to 1.
- +We look numerically stronger.
- +Easier for us to envelop the enemy.
- - Sides are vulnerable to enemy projectile attacks. - Enemy can use gaps for sword, spear attacks.
- - Too large gaps can be cut by **Wedge** formation. - We lose reach to help us together.

- **Wall. (Czech: Řada. Šik. Zed'.)**

- Shield rims close one over another like scales. Support each other.
- +Good against projectiles. +Can block and stop cavalry raid, wedge or column. (deep formation).
- +Allows rolling over the passive enemy.
- - Unsuitable to cooperation during active fight. - Supports passivity.
- - We're obstructing each other. - No place to dodge.
- - Hard to attack without extending the armed hand behind shield cover.

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# Formation: Rank vs Wall



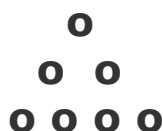


# Formations: Wedge, Wheel

- **Wedge (Czech: Klín)**

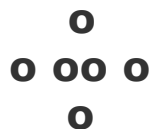
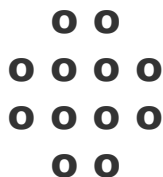
- Cutting off weak and outstretched flanks to destroy with 2nd line or rearguard.
- Cut off, encircle, destroy.
- Use best armed men to withstand many hits. Requires support of rearguard.
- Building: Begin with 1 or 3, every next row has twice more men.

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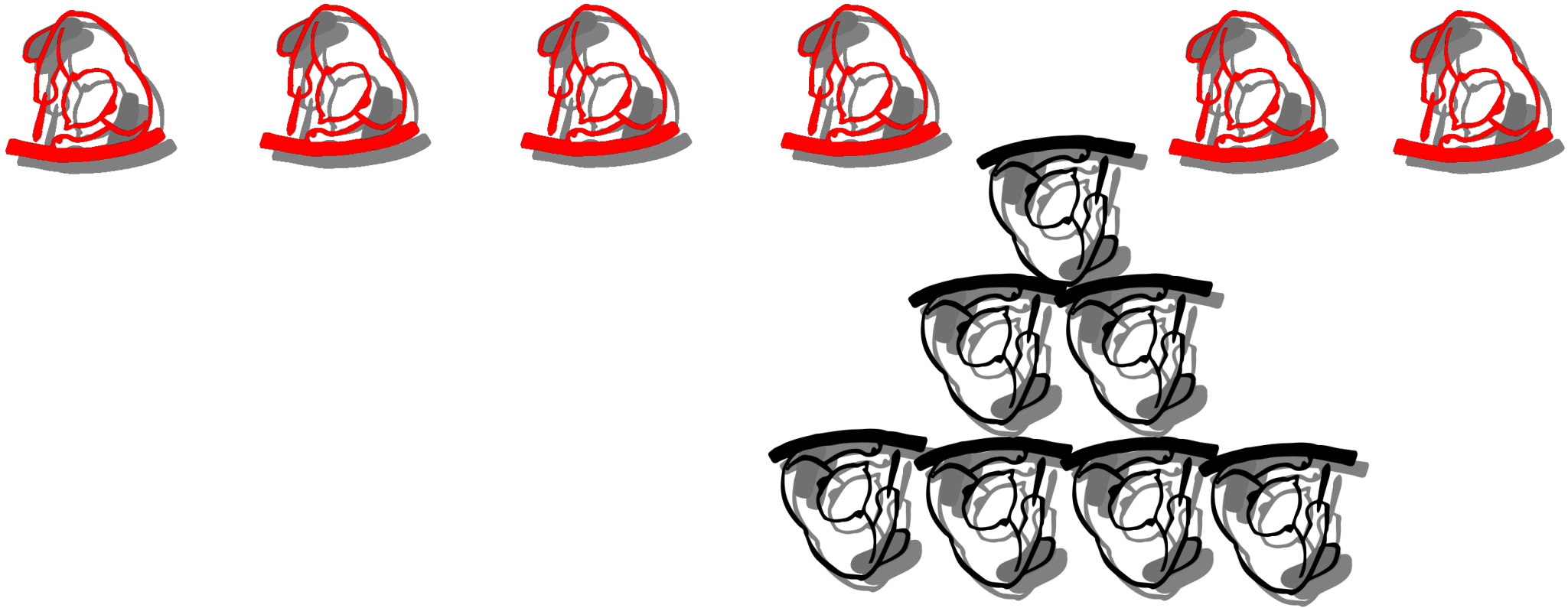


- **Wheel (Czech: Mlýnské kolo. Kruhová obrana)**

- Rounded rectangle. There are no corners outside partners reach to support.
- On edges and corners at least 2 or 3 members reach to support each other.

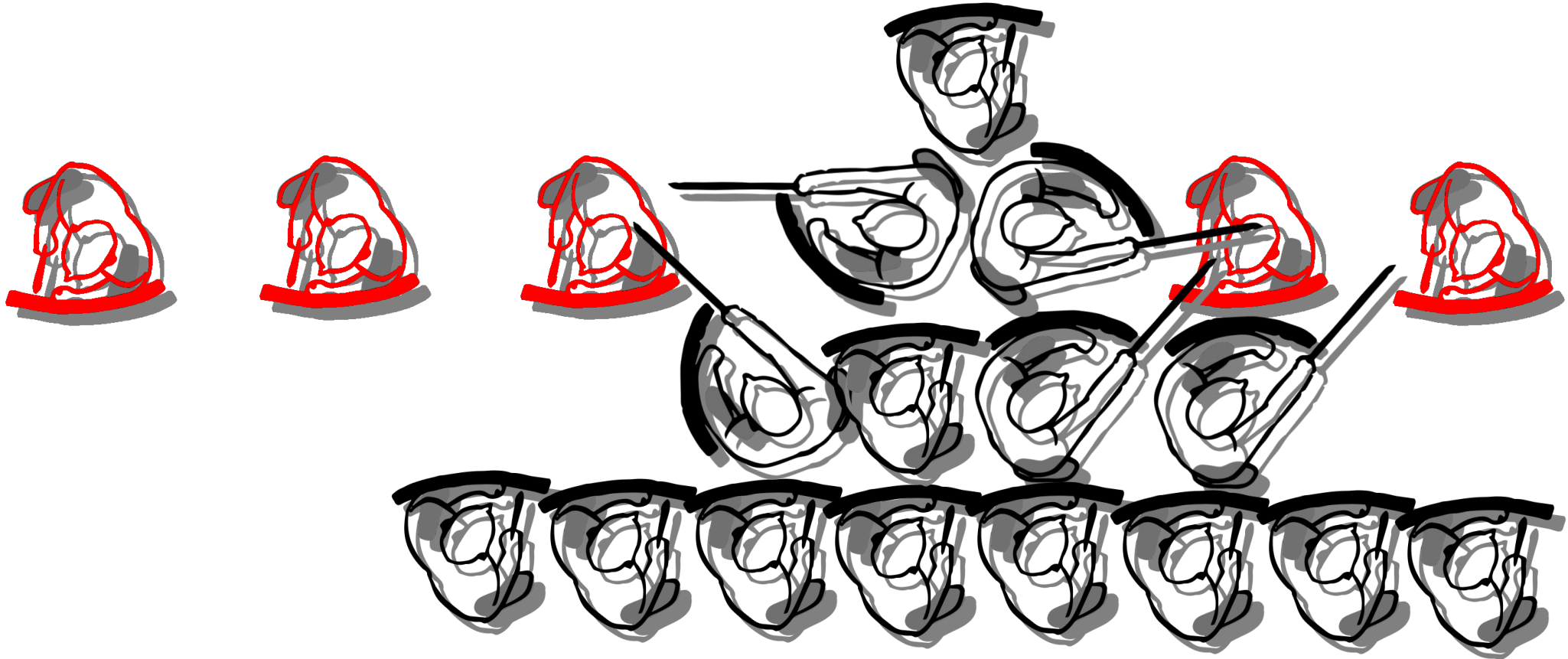


# Formation: Wedge cuts flank

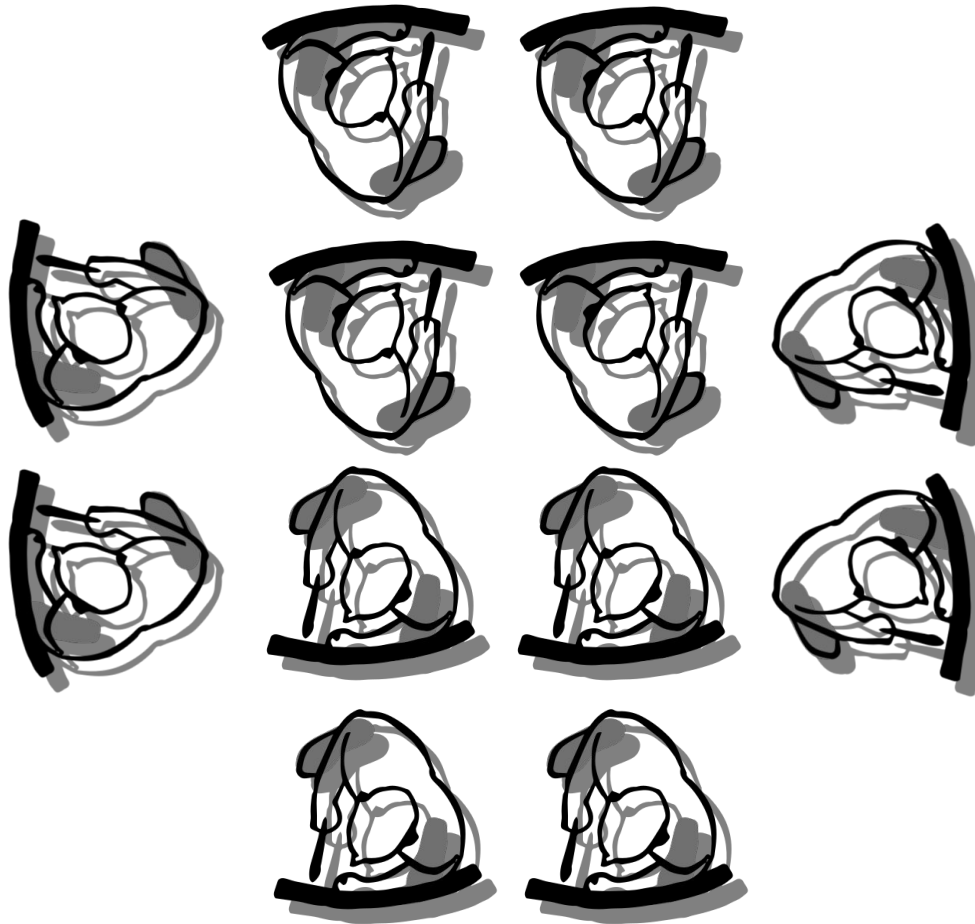




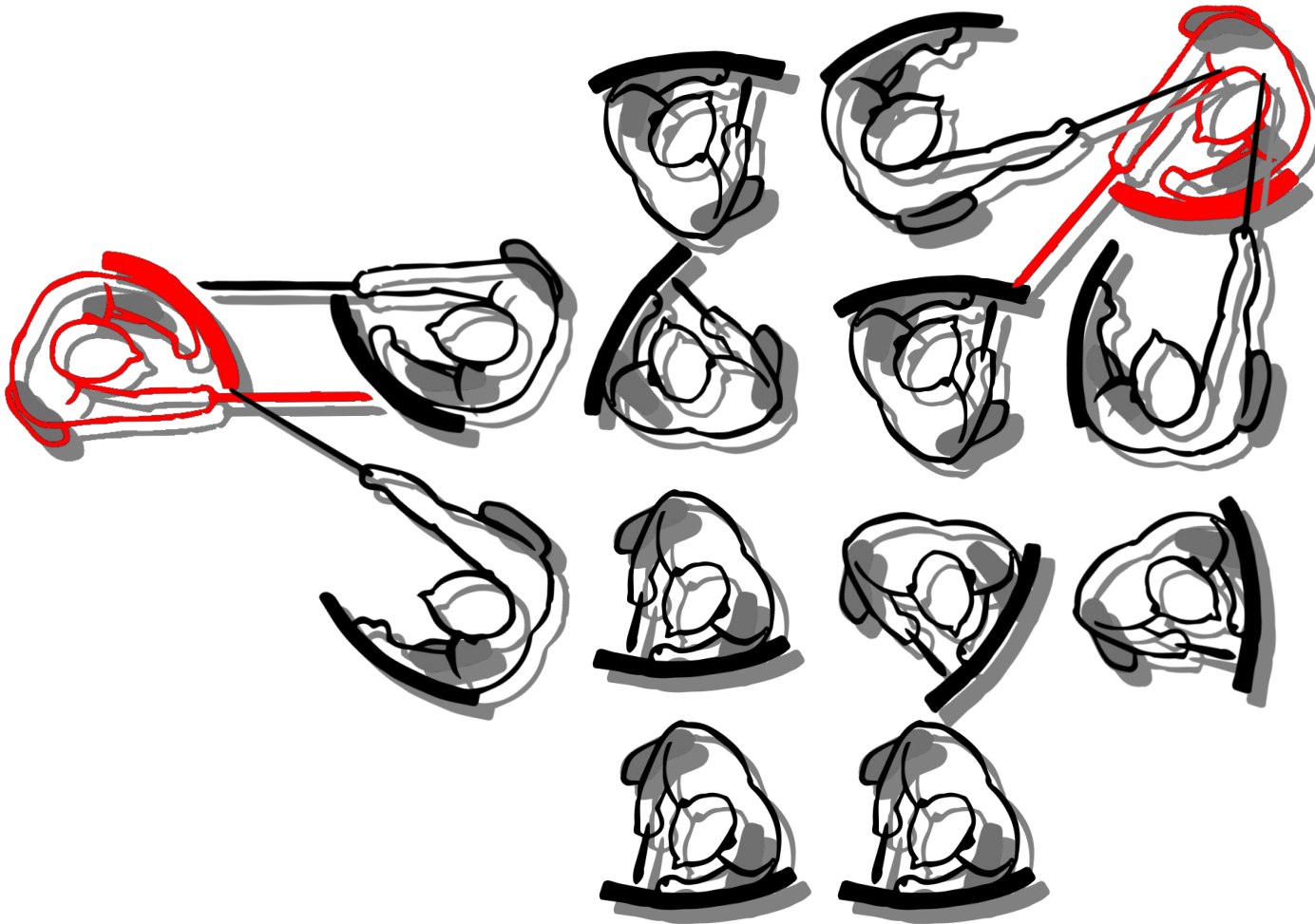
# Formation: Wedge cuts flank II



# Formation: Wheel, moving



# Formation: Wheel, defending



# Formations: Zither, Byzantium

- **Zither**

- 2 variants: D horizontally. U letter vertically.
- 2 rows with empty space between. Vertical or angled columns on flanks.
- Columns on flanks can protrude horns forward and encircle.
- Front row can step back into open space, flank columns encircle.

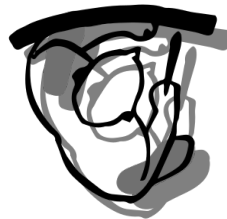


- **Byzantium**

- Center is Wall, Flanks are Ranks.
- Center can absorb and halt Wedge or Column. Flanks encircle.



# Formation: Zither



# Formation: Zither II

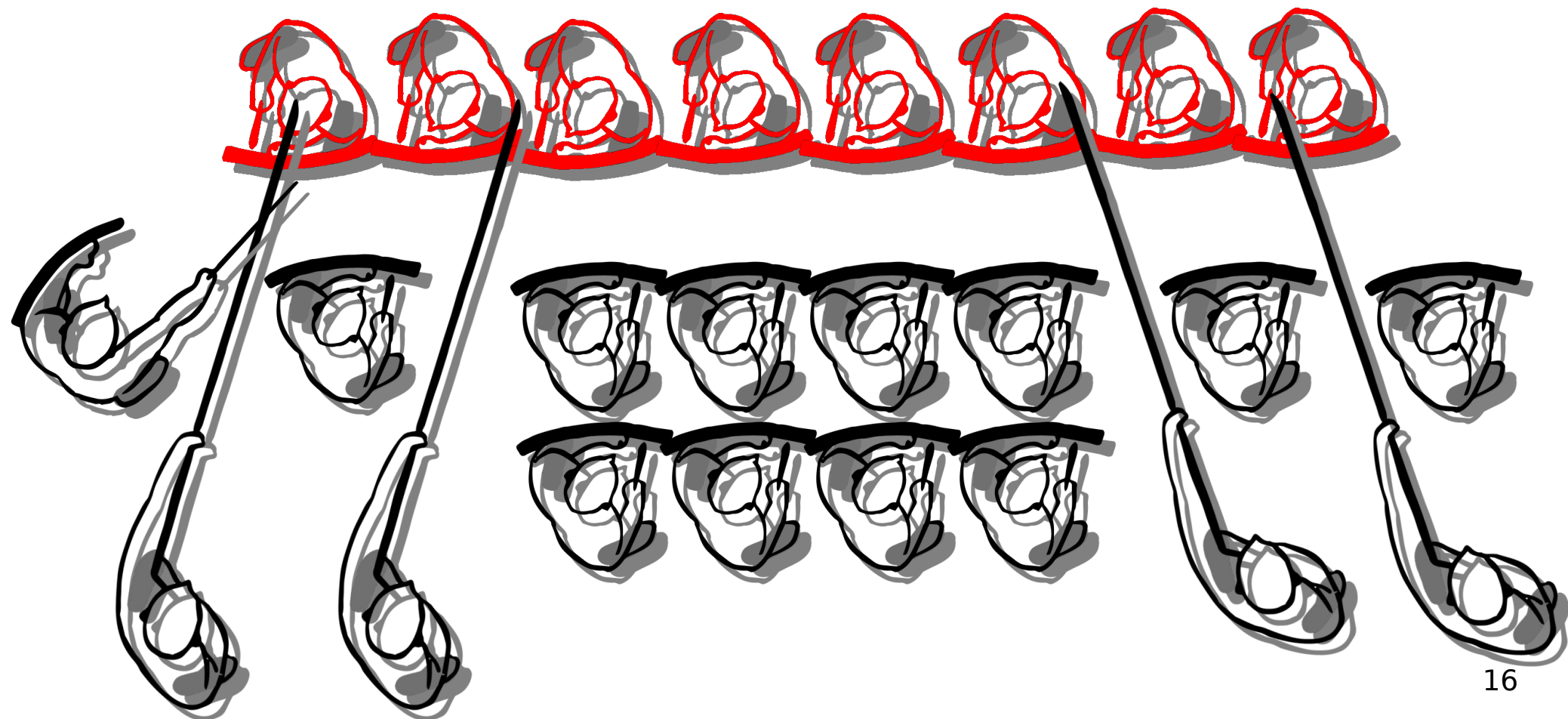


# Byzantium vs Column



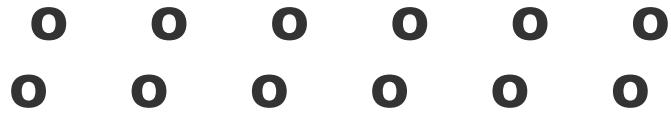


# Byzantium vs Wall



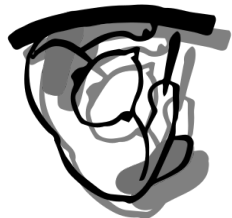
# Formation: Double posts

- Sword and shield in front, spearman is directly behind shield shoulder, protects shield-bearer, leads him when retreating.

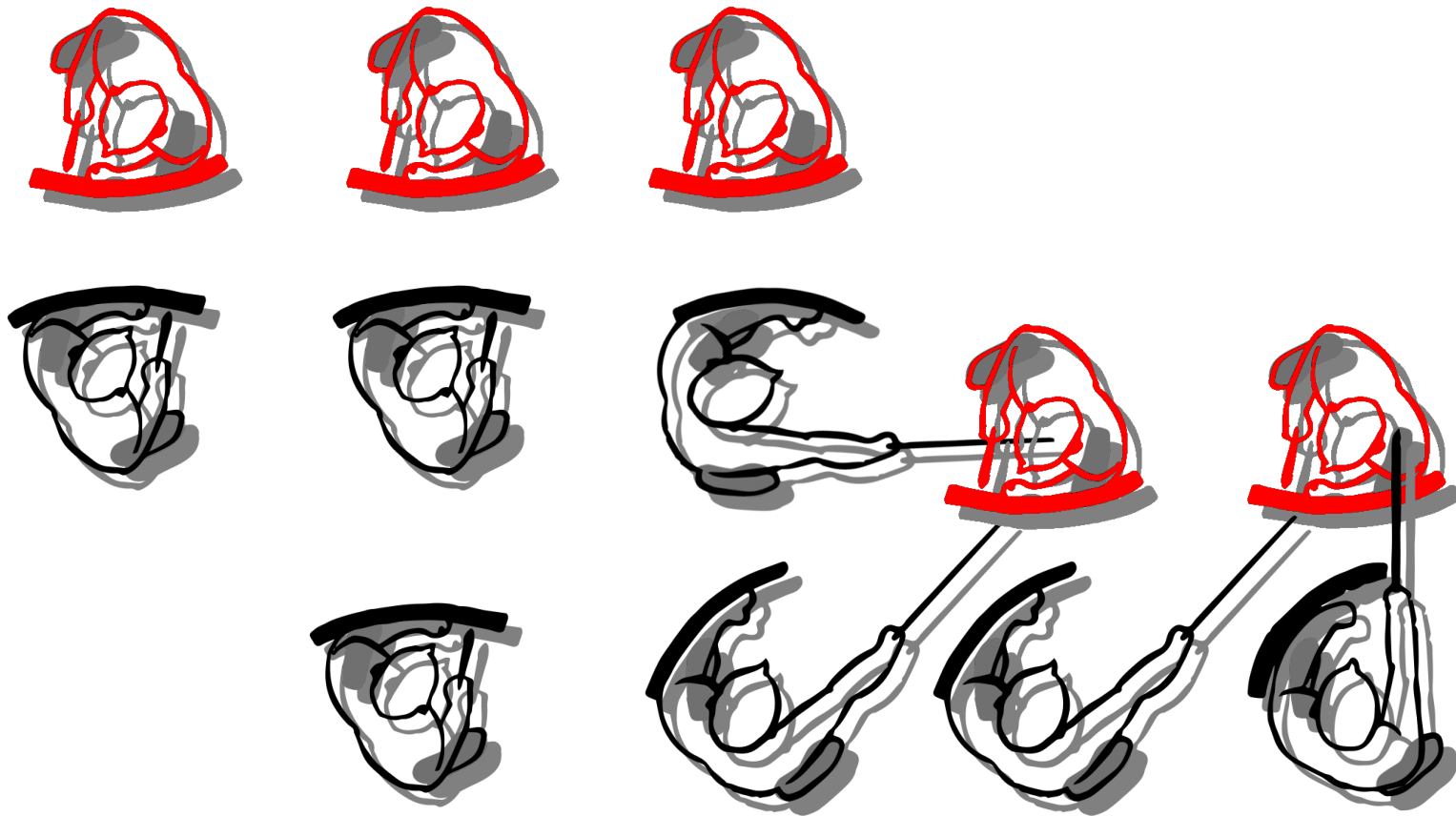


# Formation: Angled rank

- **Angled rank** (Czech: Šikmá linie):
  - Slow retreat of right flank exposes attackers' right side.
  - Beware the advancement of own left flank!



# Formation: Angled rank II



# Formations

- **Pike Wall. Court**

- Rectangular deep formations of pikement supported by slings and bows. Defense of baggage train, king-commander.

- **Roof/Roofed Wall (Czech: Šípy, Hradba)**

- Shields up against arrows, polearms hide behind.
- With 2 rows of shields in front: 1st row makes Wall, 2nd row makes Roof.
- Command LINE UP cancels Roof. Any prev. movement isn't interrupted.

- **Column (Czech: Sloupec, Kolona)**

- Pavises in front and on sides, width 3+, depth 6-10, polearms behind and inside.
- Column can breach and divide opponents like Wedge.
- Polearms hold rear, create chaos. Pavises can split in 2 sides.
- Multiple columns advance in parallel or converge.

# Formation exercises How To

- Many ways how to do it badly.
  - Bore: Infinite drills.
  - Inadequate exercises: Irrelevant experience.
  - Hard, strong, brute force approach:
    - Fatigue. Injuries. Pain. Fear. = Loss of initiative.
  - Endless losses: Loss of self-confidence. Does it make sense at all?
- **Ideal**: Make it **Fun**, make it **Game**.
- Sportslike approach is OK, has some limitations:
  - **Goal**: Winner has **smaller losses**.
  - Focus on improving **speed, reach, cooperation, initiative**.
  - Faster, better cooperating teams win. See above.
  - Motivation for improvement of the key skills.
  - No aggressivity, no injuries. Focus on „techné“.
- In fight and battle there is no sport! Reducing losses requires no fair game.
  - Powerplay games should be part of each exercise.
- Strategy is gift, working with visibility, reach, surprise.

# Formation exercises How To

- Things have to make **sense**, be **stimulating, fun**. Visible **improvement**.
  - Avoid fatigue, enjoy running, playing.
  - Get the most experience via many iterations in different circumstances.
  - Use battle games to prepare for fighting.
  - Many **tries, variants, short rounds** (2-5 minutes).
- Identify everything that blocks or slows down getting experience:
  - Distractions not leading to improvement of key capabilities:
    - Marching, brute force pushing = fatigue, bore.
  - **Fatigue** and **injuries**. Lead to passivity. Fear of doing anything.
- Publicly declare exercise **goal**. Drill, march, manoeuvres, fight...
- Cooperation in pairs and triples.
- Commander exercises:
  - Leading 5 member squads with one flag.
  - Battle optimum: 1 commander per 10 fighters.
    - Greater numbers (10+) hear commander badly during fight. Delay passing down orders.
    - Commander has worse situational awareness, his vision is obscured by 10+ people.



# Formation exercises How To

- Three types of exercise:
  - No armor (helmet, gloves), light contact.
    - Great **endurance** = many **tries** = **experience**.
    - Technical focus, speed improvements.
    - Helps: Imagine soccer, catch-me-if-you-can rather than fight.
  - Light armor, light contact = dtto + **armor verification**.
    - Quality, mobility, thermoregulation in armor.
    - **Fatigue** and **endurance** has to be the same as without armor.
  - Heavy armor, semi/full contact rules = battle conditions.
    - Light/semi/full contact or takedowns based on opponents' armor.
    - link: [Equipment conditions of Hradec court](#)
    - link: [Combat rules of Hradec court](#)
- Ideal rate for weekly exercise:
  - 3 exercises with no armor: Gain experience, speed, endurance.
  - 1 exercise in armor: Do I lose endurance, speed? If yes, Why?

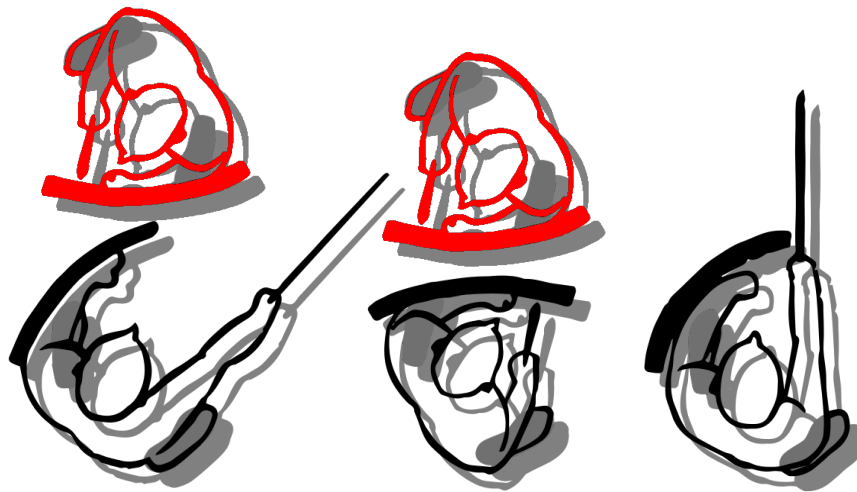
# Weapons, reach, angles

- **Sword. Shield. Halberd.**

- With left foot forward I can reach both with both weapons.
- Open shield position protects attacking sword hand.
- Weak spots: Oblique angles at sword hand. Over, under shield.
- Sword shouldn't go below hip. It can jam under shields. Slow head defense.
- Useful for thick and sparse formations. Roman way is best for thick ones.
- Front row halberd held in middle has the same reach like sword. It's fast. Anti-armor weapon.

- **Single handed Spear and Shield.**

- Spear reaches a bit further than sword. Slower reactions on change, press.
- Good against passive adversary. Support and cooperation with rear row is a must. Doesn't work in tight formations.



# Weapons, reach, angles II

- **Short spear (<250cm). Long halberd.**

- Bad reach from second row. Slow reaction to changes when held at end.
- Requires elbow+ spacing in front row.
- Useful in double posts formations when put directly behind front shield.
- Diagonal attacks. Provides roof cover to front row.
- Halberd held at end is slow and dangerous, causing inadvertent injuries.
- Best viability in front row only at flanks.

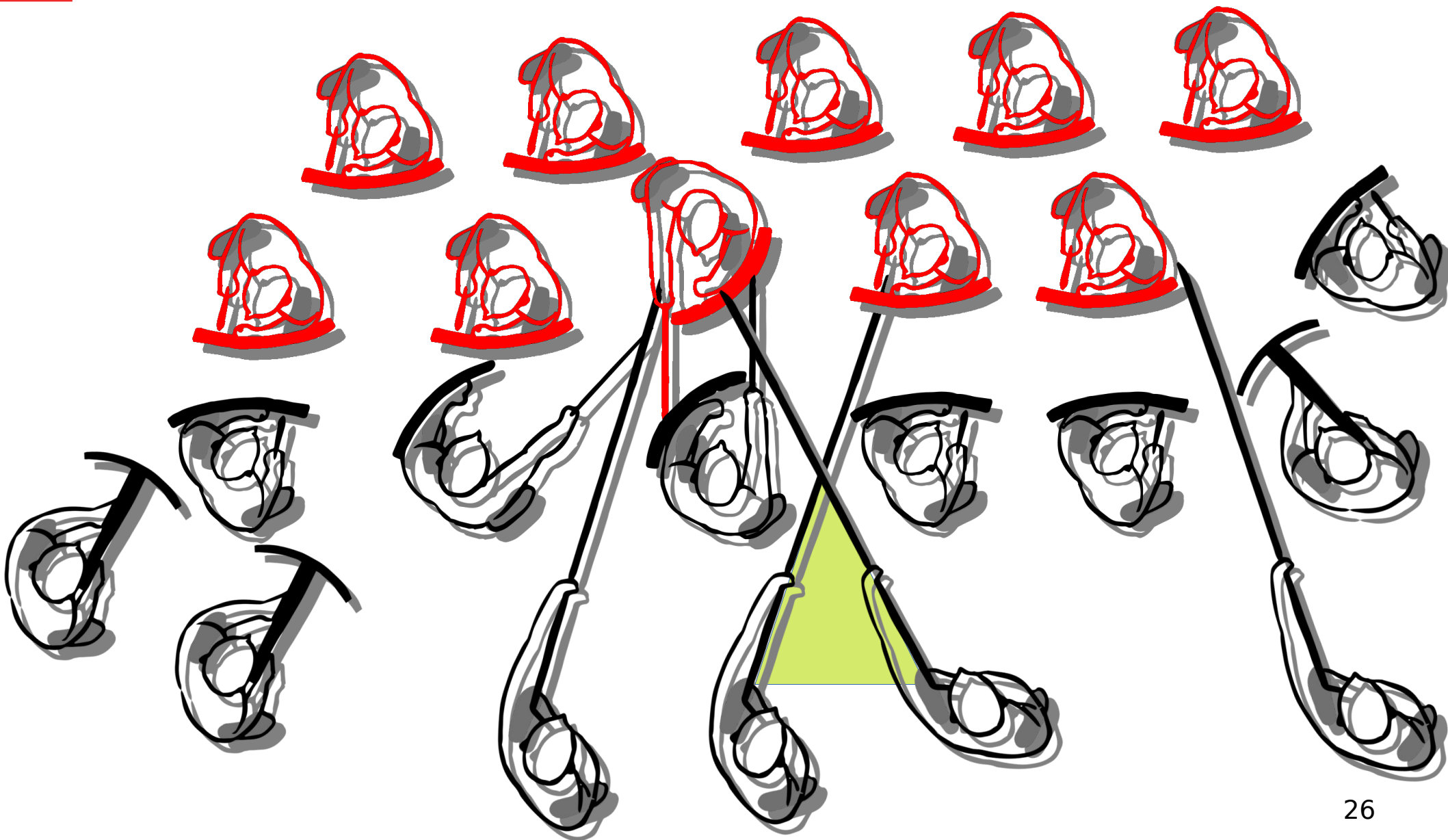
- **Long spear (250cm+). Pike (300cm+).**

- Great support of front rows when placed in second row.
- Reach same or further than front row sword. Best attacks diagonal into gaps.
- Optimal front row gap is measured by stretched right hand to left shoulder of partner in row.

- **Bows, crossbows, slings, javelins.**

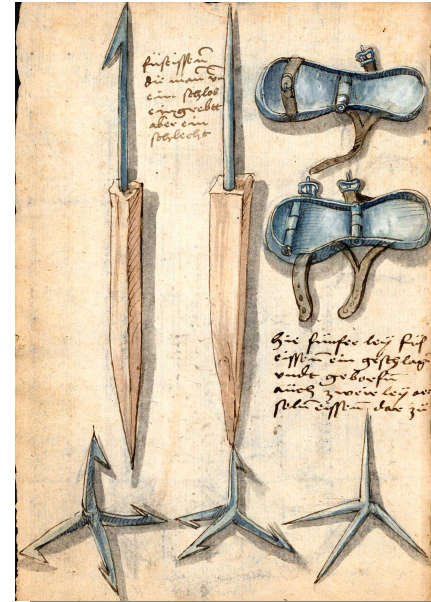
- Ideal placement on flanks and by outflankers.
- Best hits in diagonal angles into gaps, into flank and from behind. Vanguard attack units.
- Javelins useless inside tight formations. Useful in flanks.
- Marksman with shield on body or coat of plates is less frequent target of enemy marksmen.

# Weapons, reach, angles III



# Terrain, weather = weapon

- Easy terrain = numerically stronger side wins.  
More of them can reach easily.
- Obstacles can significantly reduce the reach of enemy troops.
- Hill. Depression.
  - Attack upwards slows down, exhausts, reduces reach.
  - Attack downwards gives energy and penetration.
- House, tents, fence, trees, bush, sun, wind, dust.
  - Reduces visibility, weapons reach.
- Rock, sand, swamp, water. Calthrops, traps.
  - Natural shield, defense, hard to pass obstacle.





# Exercises I

- Sword & Shield vs Sword & Shield.
- Sword & shield vs Nest of Spearmen.
- Javelins vs Sword & Shield.
- Javelins vs Nest of Spearmen.
- Archers vs Spearmen.
- Heavy center.
- Heavy flank.
- Terrain, hill, obstacles, visibility impediments.
- Double formation:
  - Front rank light armed.
  - Rear rank composed of spears, archers, heavy armed sword & shield.
- Left flank attack.
- Right flank retreat.



# Exercises II

- Outflanker groups, 3-5 people armed with:
  - 1-2 shield and sword
  - 1 long spear or halberd
  - 5 javelins or bow.
- Outflankers exercises:
  - Attack enemy formation that has flank full of spearmen.
  - Attack enemy formation that has its left flank protected.
  - Attack enemy formation that has strong right flank (heavy armor + spears).
    - Outflankers use bowmen against spears.
    - Enemy marksmen group on flank.
    - Halberd or spear blocks enemy spears, shield men sprint into close contact.
  - Blocking enemy outflankers: Wolf packs.
  - Strong flank: Spears.
  - Strong center: Wall.



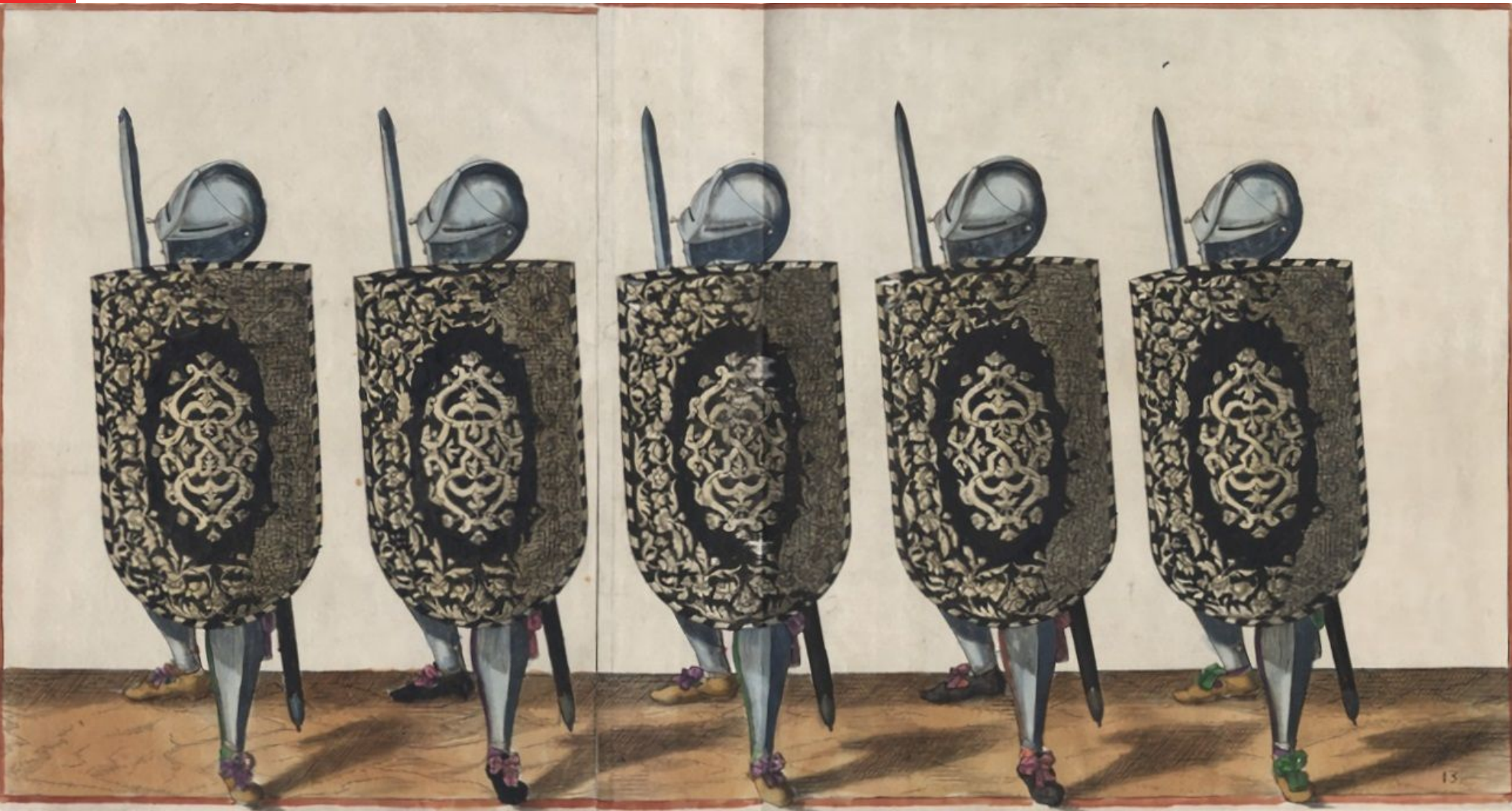
# Sources

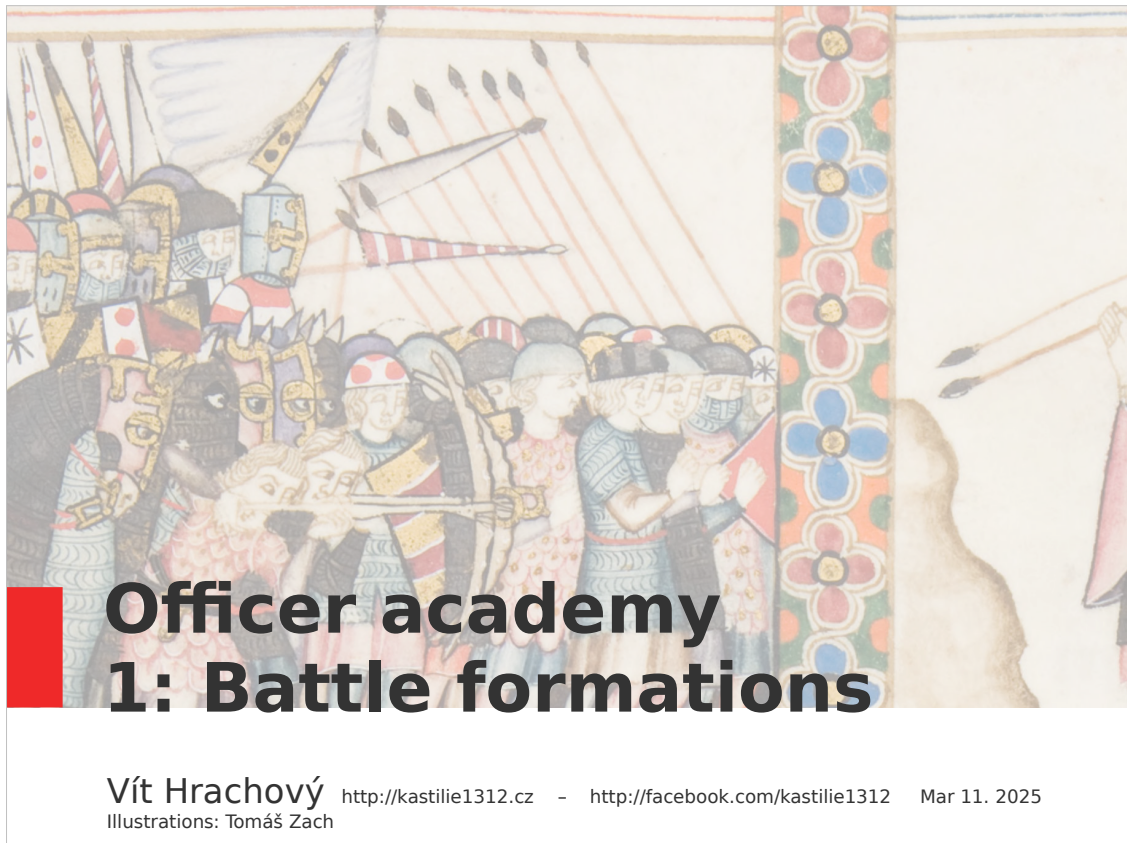
- 512BC Sun Tzu „The Art of War“
- 136AD Lucius Flavius Arrianus: „Techné taktiké“.
- 450 Flavius Vegetius Renatus: „De re militari“.
- 550 Maurikios: „Strategikon“.
- 820 Hrabanus Maurus: Comments on Vegetius, Frank army exercise descriptions.
- 900 Leo VI.: „Taktika“.
- 1119-1307 „Templar rule“ (Latin rule).
- 1265 Alfonso X: „Siete partidas“.
- 1618 Adam van Breen: „De Nassavsche Wapen-Handelinge“.
- 1645 Miyamoto Musashi „The book of Five Rings“
- 1850 US Army WigWag signals.
- 1936 „Rukověť pro aspiranty a důstojníky v záloze“. Vědecký ústav vojenský. Praha.
- 1939 Reibert: „Die Schützenkompanie“.
- 1983 Vševojsková operační a taktická terminologie:
  - 1. díl - Vojenská věda, operační umění a všeobecná taktika. Praha.
- 2000 J.K. Siddorn „Viking weapons & warfare“
- 2017 U.S. Infantry Training Circular 3-21.60 (FM 21-60).

# Credits

- Alfonso X. Unambiguous declaration of armor requirements, battle formations, hundreds of detailed illuminations.
- Arrianus, Vegetius, Mauricius, Hrabanus Maurus, Leo VI, Maurice de Nassau: Great sources.
- Gentlemen from Bílá, Blatná, Dobřenice, Javornice, Hrádek, Kravaře, Libiř, Lomnice, Loupežník, Němčice, Nové Hradky, Rabštejn, Sonnberg, Strakonice, Štěkeň, Štítná, Vrcov, Wrau, and others from project of Queen Elizabeth Richenza court.
- Dagfari, Vojtěch Půlpán, Rogan and other Czech reenactment military commanders.
- Honza Hans Hoffmann for support, experience, figures, long company.
- Pero Cornel for Spanish commands and long fruitful cooperation.
- Tomáš Zach for illustrations.
- +Many others willing to share experience.

# Questions, discussion





## Cantigas de Santa Maria Florence 408-1-2.

This contribution to officer academy can be understood as yearly or multi-year action plan for officers and crew.

What to exercise, how to exercise to make it more fun and less pain, what are the expected results. Many observations originated at gentlemen of Queen Elisabeth Richenza project and early medieval reenactor commanders.

I consider this series as collective work. I'm putting this together with intent, that the student can see and understand the order and sense in things and this can be simple to transfer.



## Contents

- Formations theory.
- Formation exercises how to.
- Weapon reach.
- Q/A.



## Lapidario 228-4

This talk is bag of kinder lego bricks to play for commanders, teachers and exercise leaders.

The base origin of working with commanders and soldier training is Mirek from Libiš. I'd like to express my sincere gratitude to him. Thank you for your trust, for giving me the opportunity!



# Formations theory

- Goal:  
Maximize enemy losses.  
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- Without people to lead, officer is just a man.
- Battle formation: **Tool** to get advantage.
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  - Adapts to terrain, numbers and weapons of both sides.
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- Main target:
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3

One has to learn to handle the tool first, then the tool becomes useful.

Swordplay duel is about speed, reach and biomechanics (tempo, measure, biomechanics).

Group fighting use the same, but on group level. Teamwork, cooperation, work with reach on basis of teams, squads, whole tactical units.

Sergeant-officer takes care of his people.

His task is their survival.

Officers' work is similar to top level sport coach.

Care for soldiers, selecting optimal tools and equipment, teaching and expanding key skills for fight and survival, preparing the path, so they are ready to make the best performance.



# Formations theory: Key factors

- **Reach**
  - Opens path to (local) numerical advantage.
  - Reduces number of active enemy troops.
    - Terrain, obstacles, weapons length and firing range...
- **Initiative** = Decision making
  - Who wins initiative, decides about when, where and what happens on the field.
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- - Hard to attack without extending the armed hand behind shield cover.

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Optimal fighting techniques for close contact fight in thick formation is stabbing (Roman drill):

- over shield rim, into face, neck, collarbones
- or under shield rim:
  - under skirt,
  - into femoral arteries
  - or from below into throat or under chin.

Unfortunately we cannot do this in our game, this is working too well and dangerous as hell.

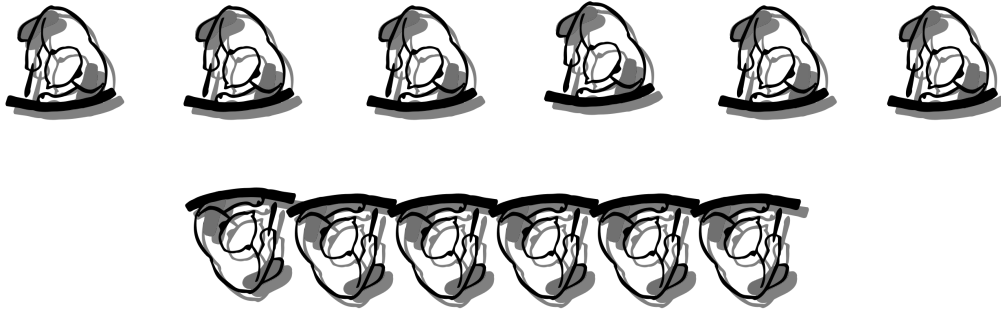
What's remaining are cuts at exposed targets, head and hand. At the borders of formation we can cut leg under the shield.

It's frequently better for thick formations not to attempt fencing and rather knock down the enemy. Bowling.

In sparse formation (rank) I don't obstruct myself and my peers. Hind row spear behind me will reach my targets in diagonal angles.

I can dodge blows to the left, right and back a bit.

## Formation: Rank vs Wall



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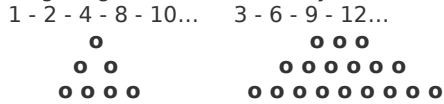
Having the same number of soldiers in both squads, rank more easily outflanks the wall.

# Formations: Wedge, Wheel

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- Cutting off weak and outstretched flanks to destroy with 2nd line or rearguard.
- Cut off, encircle, destroy.
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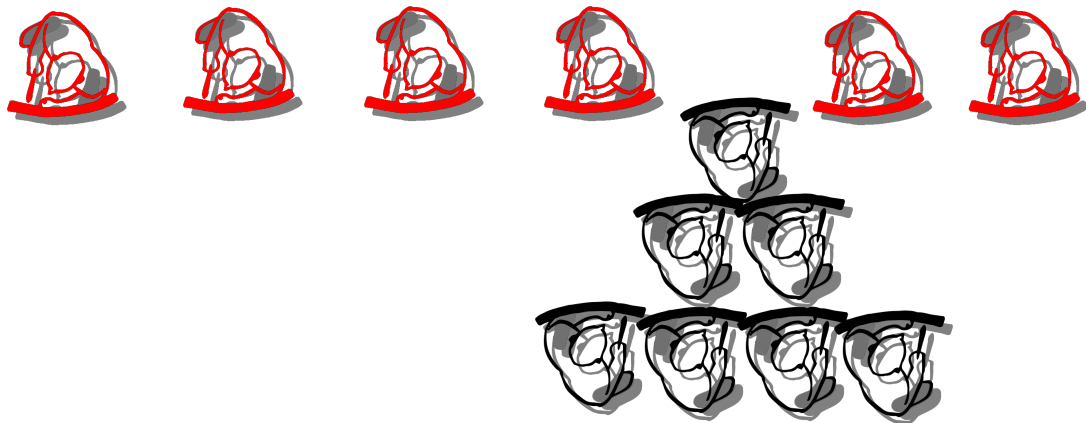


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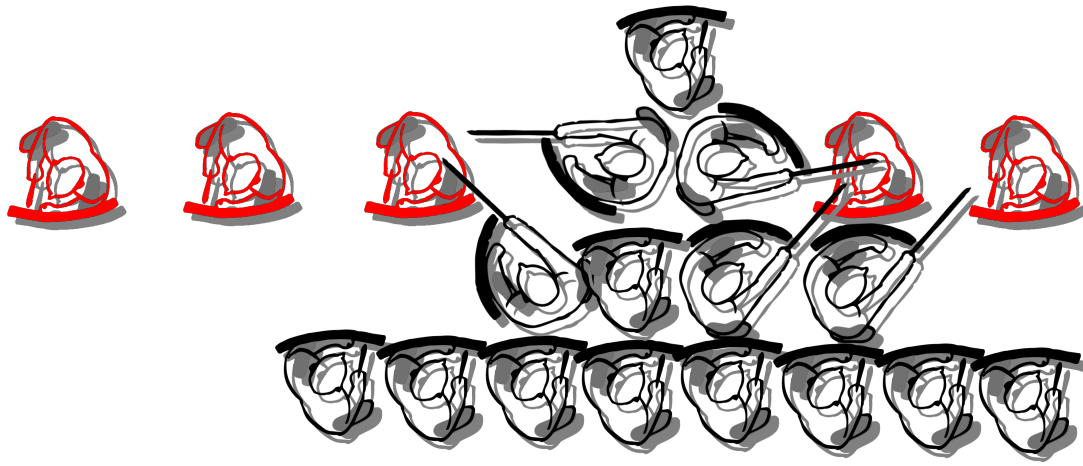
## Formation: Wedge cuts flank



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Before contact the wedge looks forwards.  
Gathering speed and puncturing strength.

## Formation: Wedge cuts flank II



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Wedge tip (the first to first three rows, according to the formation depth) primary job is to get between enemy troops, not fighting.

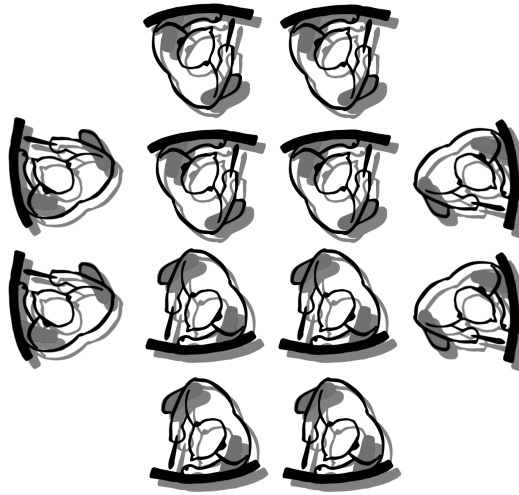
(It can return fire / hits if needed.)

Tip uses its shields to provide flank cover for next rows (second and next ones). Has to be equipped in heavy armor to withstand many hits without falling.

At the enemy flank cut off moment, the left side of wedge turns face to left, right side turns face to right.

The smaller piece of enemy formation is isolated, surrounded and destroyed with localized powerplay.

## Formation: Wheel, moving



10

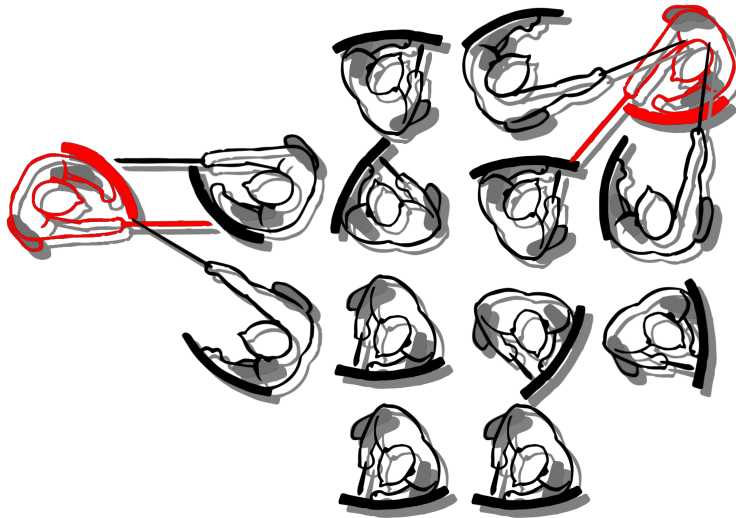
Assuming weapon and weapon length parity:

Attacker cannot reach one single lone defender from any side. Attacker always gets into reach of two to three weapons.

Gaps are necessary for wheel, so we can dodge and help each other during fighting and marching. Frequent error in this formation is tightening shoulder to shoulder. We lose mobility. We become easy prey.

Marching variant for insiders.

## Formation: Wheel, defending



11

Assuming weapon and weapon length parity:

Attacker cannot reach one single lone defender from any side. Attacker always gets into reach of two to three weapons.

Battle variation: Insiders turned faces into gaps and is ready to support team members.

# Formations: Zither, Byzantium

## • Zither

- 2 variants: D horizontally. U letter vertically.
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- Columns on flanks can protrude horns forward and encircle.
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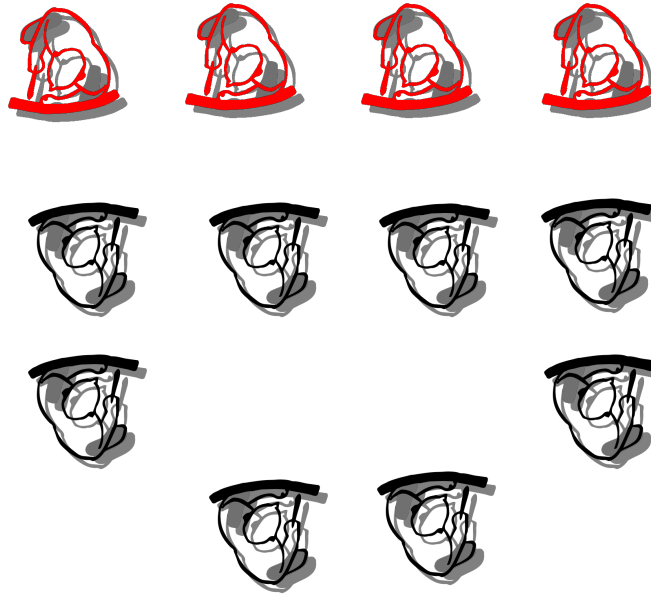
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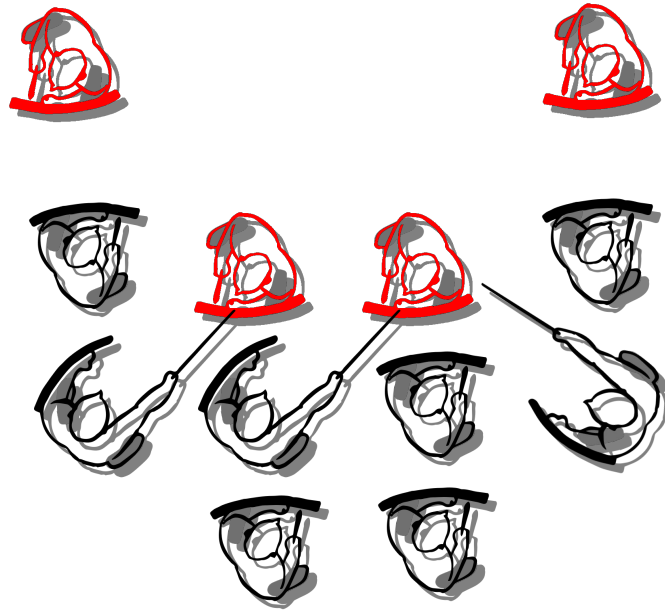




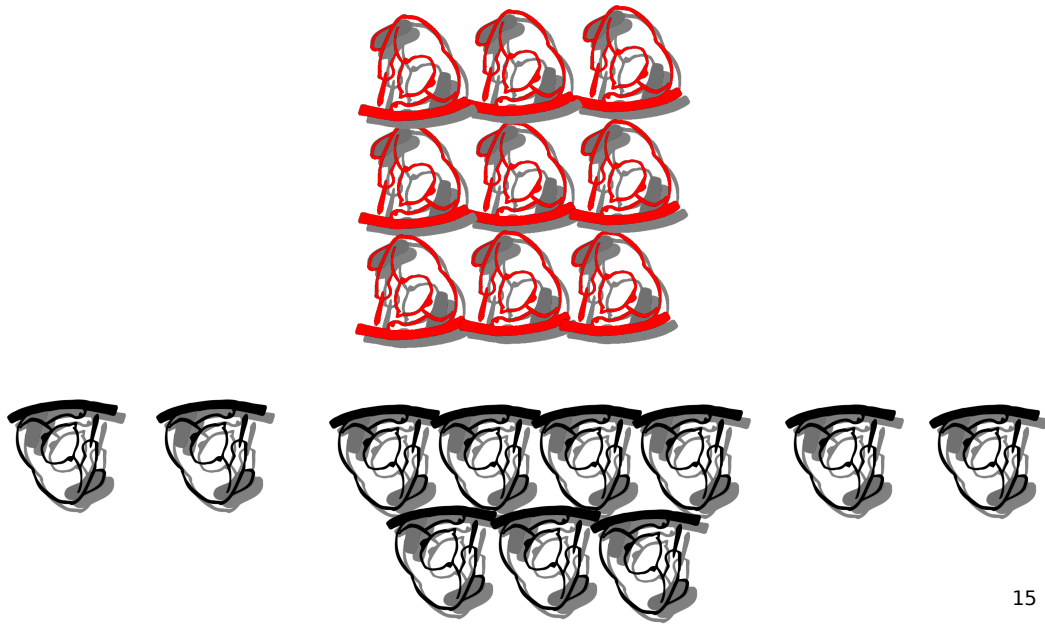
## Formation: Zither



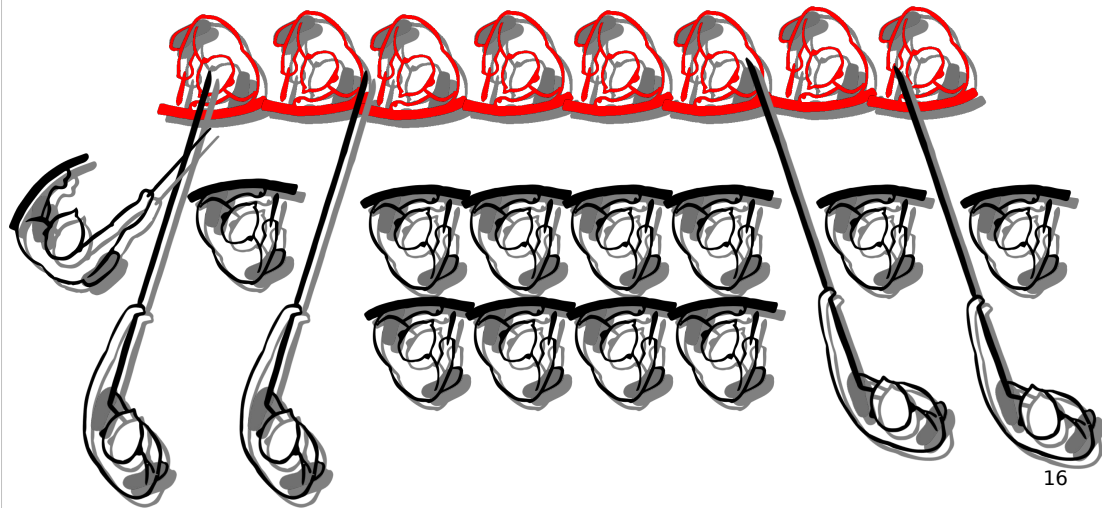
## Formation: Zither II



# Byzantium vs Column



## Byzantium vs Wall



## Formation: Double posts

- Sword and shield in front, spearman is directly behind shield shoulder, protects shield-bearer, leads him when retreating.



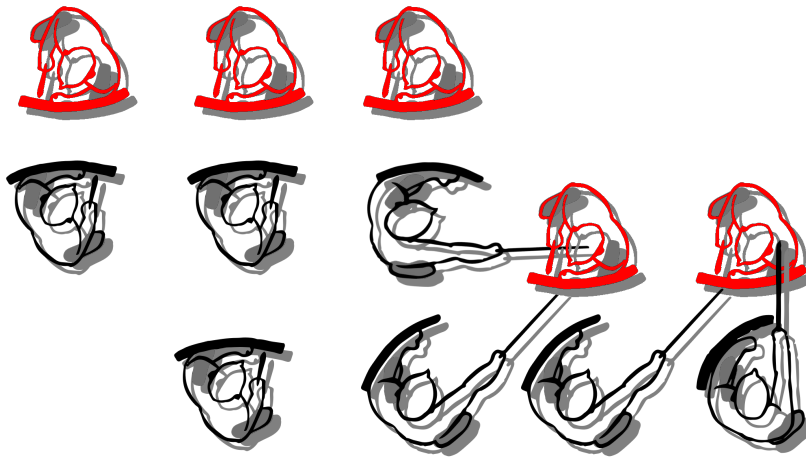
# Formation: Angled rank

- **Angled rank** (Czech: Šikmá linie):

- Slow retreat of right flank exposes attackers' right side.
- Beware the advancement of own left flank!



## Formation: Angled rank II





# Formations

- **Pike Wall. Court**

- Rectangular deep formations of pikement supported by slings and bows.  
Defense of baggage train, king-commander.

- **Roof/Roofed Wall (Czech: Šípy, Hradba)**

- Shields up against arrows, polearms hide behind.
- With 2 rows of shields in front: 1st row makes Wall, 2nd row makes Roof.
- Command LINE UP cancels Roof. Any prev. movement isn't interrupted.

- **Column (Czech: Sloupec, Kolona)**

- Pavises in front and on sides,  
width 3+, depth 6-10, polearms behind and inside.
- Column can breach and divide opponents like Wedge.
- Polearms hold rear, create chaos. Pavises can split in 2 sides.
- Multiple columns advance in parallel or converge.

[https://en.wikipedia.org/wiki/Tactical\\_formation](https://en.wikipedia.org/wiki/Tactical_formation)





# Formation exercises How To

- Many ways how to do it badly.
  - Bore: Infinite drills.
  - Inadequate exercises: Irrelevant experience.
  - Hard, strong, brute force approach:
    - Fatigue. Injuries. Pain. Fear. = Loss of initiative.
  - Endless losses: Loss of self-confidence. Does it make sense at all?
- **Ideal:** Make it **Fun**, make it **Game**.
- Sportslike approach is OK, has some limitations:
  - **Goal:** Winner has **smaller losses**.
  - Focus on improving **speed, reach, cooperation, initiative**.
  - Faster, better cooperating teams win. See above.
  - Motivation for improvement of the key skills.
  - No aggressivity, no injuries. Focus on „techné“.
- In fight and battle there is no sport! Reducing losses requires no fair game.
  - Powerplay games should be part of each exercise.
- Strategy is grift, working with visibility, reach, surprise.



# Formation exercises How To

- Things have to make **sense**, be **stimulating, fun**. Visible **improvement**.
  - Avoid fatigue, enjoy running, playing.
  - Get the most experience via many iterations in different circumstances.
  - Use battle games to prepare for fighting.
  - Many **tries, variants, short rounds** (2-5 minutes).
- Identify everything that blocks or slows down getting experience:
  - Distractions not leading to improvement of key capabilities:
    - Marching, brute force pushing = fatigue, bore.
  - **Fatigue** and **injuries**. Lead to passivity. Fear of doing anything.
- Publicly declare exercise **goal**. Drill, march, manoeuvres, fight...
- Cooperation in pairs and triples.
- Commander exercises:
  - Leading 5 member squads with one flag.
  - Battle optimum: 1 commander per 10 fighters.
    - Greater numbers (10+) hear commander badly during fight. Delay passing down orders.
    - Commander has worse situational awareness, his vision is obscured by 10+ people.



# Formation exercises How To

- Three types of exercise:
  - No armor (helmet, gloves), light contact.
    - Great **endurance** = many **tries** = **experience**.
    - Technical focus, speed improvements.
    - Helps: Imagine soccer, catch-me-if-you-can rather than fight.
  - Light armor, light contact = dtto + **armor verification**.
    - Quality, mobility, thermoregulation in armor.
    - **Fatigue** and **endurance** has to be the same as without armor.
  - Heavy armor, semi/full contact rules = battle conditions.
    - Light/semi/full contact or takedowns based on opponents' armor.
    - link: [Equipment conditions of Hradec court](#)
    - link: [Combat rules of Hradec court](#)
- Ideal rate for weekly exercise:
  - 3 exercises with no armor: Gain experience, speed, endurance.
  - 1 exercise in armor: Do I lose endurance, speed? If yes, Why?

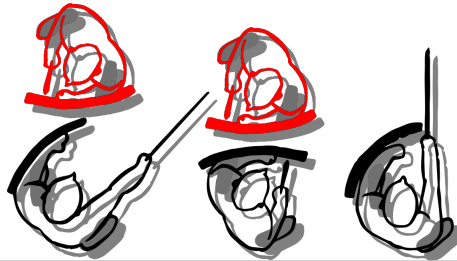
# Weapons, reach, angles

- **Sword. Shield. Halberd.**

- With left foot forward I can reach both with both weapons.
- Open shield position protects attacking sword hand.
- Weak spots: Oblique angles at sword hand. Over, under shield.
- Sword shouldn't go below hip. It can jam under shields. Slow head defense.
- Useful for thick and sparse formations. Roman way is best for thick ones.
- Front row halberd held in middle has the same reach like sword. It's fast. Anti-armor weapon.

- **Single handed Spear and Shield.**

- Spear reaches a bit further than sword. Slower reactions on change, press.
- Good against passive adversary. Support and cooperation with rear row is a must. Doesn't work in tight formations.



## Weapons, reach, angles II

- **Short spear (<250cm). Long halberd.**

- Bad reach from second row. Slow reaction to changes when held at end.
- Requires elbow+ spacing in front row.
- Useful in double posts formations when put directly behind front shield.
- Diagonal attacks. Provides roof cover to front row.
- Halberd held at end is slow and dangerous, causing inadvertent injuries.
- Best viability in front row only at flanks.

- **Long spear (250cm+). Pike (300cm+).**

- Great support of front rows when placed in second row.
- Reach same or further than front row sword. Best attacks diagonal into gaps.
- Optimal front row gap is measured by stretched right hand to left shoulder of partner in row.

- **Bows, crossbows, slings, javelins.**

- Ideal placement on flanks and by outflankers.
- Best hits in diagonal angles into gaps, into flank and from behind. Vanguard attack units.
- Javelins useless inside tight formations. Useful in flanks.
- Marksman with shield on body or coat of plates is less frequent target of enemy marksmen.

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Marksman can benefit company of shield bearer that wears full quivers on sides and back.

Marksman wears body shield or coat of plates.

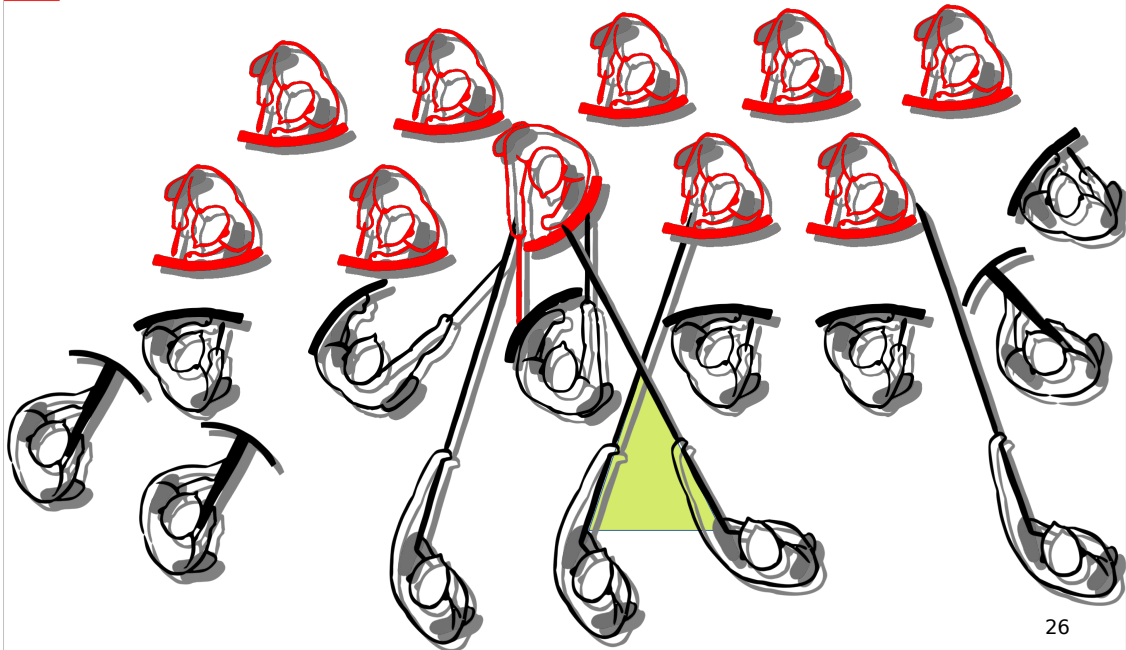
- Learns how to fire with it.
- Body protection = enemy fire prevention.

Two marksmen cooperate on single target from two diagonal angles.

Target selection:

- Best target is light armored man.
  - Heavy armored tend to ignore hits.
1. Commander disposal is primary target.
  2. Then long weapons.
  3. Then shield bearers.

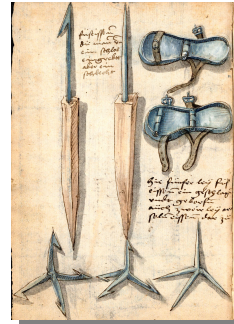
## Weapons, reach, angles III



Note the working angle span of hind row spears in sparse formation.

# Terrain, weather = weapon

- Easy terrain = numerically stronger side wins. More of them can reach easily.
- Obstacles can significantly reduce the reach of enemy troops.
- Hill. Depression.
  - Attack upwards slows down, exhausts, reduces reach.
  - Attack downwards gives energy and penetration.
- House, tents, fence, trees, bush, sun, wind, dust.
  - Reduces visibility, weapons reach.
- Rock, sand, swamp, water. Calthrops, traps.
  - Natural shield, defense, hard to pass obstacle.



Steep hill exhausts heavy armed soldiers.

Hill slows down and exhausts cavalry.

Battle at Chlumec and Brůdek 1040, 1126.

For attacker it's hard to reach head and hands from below. Primary target is legs. Attackers' head and hands are exposed.

Depression, bush, houses, trees reduce visibility.

Good place to hide surprise attack troops.

Sun, wind, dust reduce vision.

Blinded soldiers can neither attack nor cooperate well.

Rock, sand, swamp, water, traps, calthrops:

Limit and slow down enemy mobility and reach.

Wind - dust - limestone - hot sand.

Soap on ship board.

1505 a.d. calthrops and iron soles.

Löffelholz Codex, Ms Berol Germ Qu 132 f.030v  
2.a.d. Roman calthrop



# Exercises I

- Sword & Shield vs Sword & Shield.
- Sword & shield vs Nest of Spearmen.
- Javelins vs Sword & Shield.
- Javelins vs Nest of Spearmen.
- Archers vs Spearmen.
- Heavy center.
- Heavy flank.
- Terrain, hill, obstacles, visibility impediments.
- Double formation:
  - Front rank light armed.
  - Rear rank composed of spears, archers, heavy armed sword & shield.
- Left flank attack.
- Right flank retreat.





## Exercises II

- Outflanker groups, 3-5 people armed with:
  - 1-2 shield and sword
  - 1 long spear or halberd
  - 5 javelins or bow.
- Outflankers exercises:
  - Attack enemy formation that has flank full of spearmen.
  - Attack enemy formation that has its left flank protected.
  - Attack enemy formation that has strong right flank (heavy armor + spears).
    - Outflankers use bowmen against spears.
    - Enemy marksmen group on flank.
    - Halberd or spear blocks enemy spears, shield men sprint into close contact.
  - Blocking enemy outflankers: Wolf packs.
  - Strong flank: Spears.
  - Strong center: Wall.

# Sources

- 512BC Sun Tzu „The Art of War“
- 136AD Lucius Flavius Arrianus: „Techné taktiké“.
- 450 Flavius Vegetius Renatus: „De re militari“.
- 550 Maurikios: „Strategikon“.
- 820 Hrabanus Maurus: Comments on Vegetius, Frank army exercise descriptions.
- 900 Leo VI.: „Taktika“.
- 1119-1307 „Templar rule“ (Latin rule).
- 1265 Alfonso X: „Siete partidas“.
- 1618 Adam van Breen: „De Nassavsche Wapen-Handelinge“.
- 1645 Miyamoto Musashi „The book of Five Rings“
- 1850 US Army WigWag signals.
- 1936 „Rukověť pro aspiranty a důstojníky v záloze“. Vědecký ústav vojenský. Praha.
- 1939 Reibert: „Die Schützenkompanie“.
- 1983 Vševojsková operační a taktická terminologie:  
I. díl - Vojenská věda, operační umění a všeobecná taktika. Praha.
- 2000 J.K. Siddorn „Viking weapons & warfare“
- 2017 U.S. Infantry Training Circular 3-21.60 (FM 21-60).

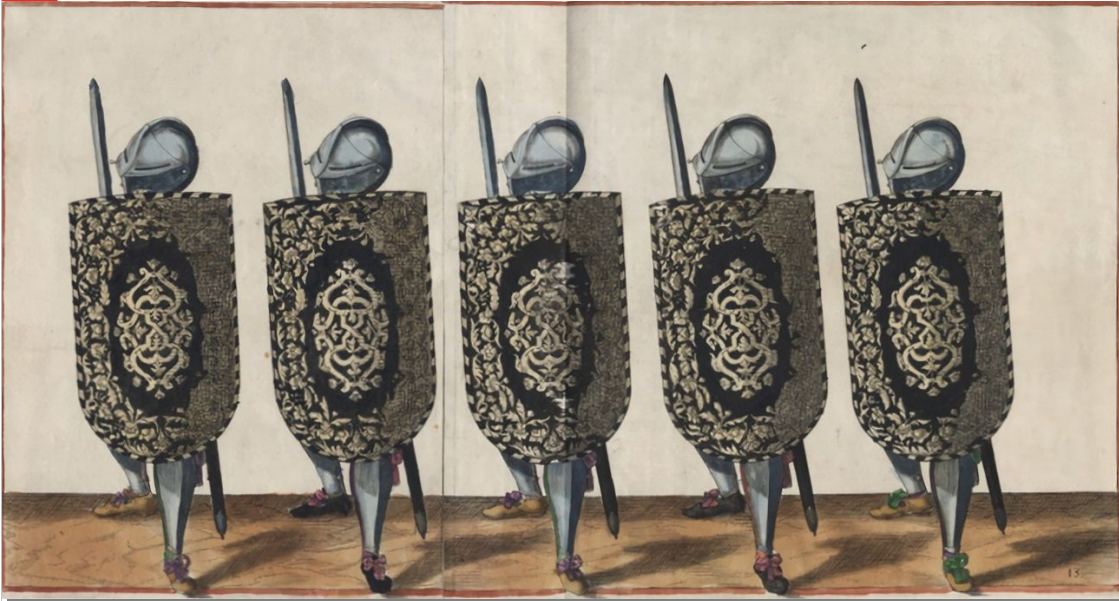
Vegetius was 2nd most copied medieval book.  
Had its place in every rulers' bookshelf.  
Leo VI is available in Spain since 11th century.



# Credits

- Alfonso X. Unambiguous declaration of armor requirements, battle formations, hundreds of detailed illuminations.
  - Arrianus, Vegetius, Mauricius, Hrabanus Maurus, Leo VI, Maurice de Nassau: Great sources.
  - Gentlemen from Bílá, Blatná, Dobřenice, Javornice, Hrádek, Kravaře, Libiř, Lomnice, Loupežník, Němčice, Nové Hradky, Rabštejn, Sonnberg, Strakonice, Štěkeň, Štítná, Vrcov, Wrauu, and others from project of Queen Elizabeth Richenza court.
  - Dagfari, Vojtěch Půlpán, Rogan and other Czech reenactment military commanders.
  - Honza Hans Hoffmann for support, experience, figures, long company.
  - Pero Cornel for Spanish commands and long fruitful cooperation.
  - Tomáš Zach for illustrations.
- 
- +Many others willing to share experience.

## Questions, discussion



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1618 Adam van Breen: „De Nassavsche Wapen-Handelinghe“.