12 Dimensional Fencing

Baron Llwyd Aldrydd, Atlantia
BaronLlwyd@gmail.com
m.k.a. Lloyd B. Eldred

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Abstract

Learn how rocket dynamics can be applied to expanding your rapier repertoire! This class for intermediate fencers emphasizes fluid use of space, velocity, and angles. Topics will include range, lines of attacks, wards and analysis of your opponents' stances and preferences.

Introduction

Who am I?

I have been an SCA rapier fighter for more than 15 years. I've lived and fenced in Atlantia, the Midrealm, and the West. I have served as Baronial and Principality Rapier marshals. Currently I'm the Baron of Tir-y-Don in Atlantia and Deputy Kingdom Rapier Marshal for Virginia and Maryland. In the modern world, I have a Ph.D. in Aerospace Engineering and work as a NASA contractor doing structural design and analysis of aircraft and launch vehicles.

What is this class?

This class is targeted at the late beginner to intermediate fencer. Advanced dualists may pick up a new trick or two or learn a new way of explaining techniques that they already use. The main point of the class is the recognition that the sword can be positioned, oriented, and moved arbitrarily in space. This allows the use of shots outside of the modern-style thrusts and parries. Most of the meat of the course will discuss how to narrow this infinite potential repertoire into a set of moves that are effective for the situation and opponent you face at any given moment. Finally, we'll discuss how to deal with those goofy stances and shots that crop up from time to time (often after someone takes this class!)

The Main Pitch

Terminology: Dimensions/Degrees of Freedom/State Variables

For this part of the course I'll blend a variety of engineering terms that have significant distinctions in meaning that are completely unimportant for this course. For my fellow engineers out there, please just grit your teeth and bear with me. This course is called 12-Dimensional Fencing. The engineering terms "state variable" or "degree of freedom" are

probably more accurate than “dimension” for what I’m describing. Still, for current purposes, we can define a dimension as an independent variable necessary to describe the motion of the rapier.

1, 2, and 3 Dimensional fencing

To illustrate this definition, let’s consider the early advancement of a complete novice’s thrusts. At first, he has a single motion, a single speed, and a single intended target. You can describe the motion with a single variable (percent extension). That complete novice is a one-dimensional fencer. Shortly, he may expand his repertoire to targeting an arc across his opponent’s chest. Now it takes two variables to describe his sword’s position. Finally, he may expand to targeting the entire torso, from the same initial stance, and still at a single speed. He’s now three-dimensional, and possibly nearing being able to authorize. But I’m sure you see he has a long way to go to be an effective fencer.

Rocket Science

An engineer describing the trajectory of an aircraft or rocket will typically use 12 variables, sometimes more. The names of these variables will change depending on his purpose, but will ignore the differences in body, wind, ground, and inertial frames and just use whatever is convenient at the time.

These twelve variables are actually four groups of three.

The first group of variables is the position variables *x*, *y*, and *z*. These describe the position of the center of mass of the vehicle.

The second group is the alignment variables, α, β, and γ (alpha, beta, and gamma). These describe the vehicle’s angle of attack, sideslip angle, and roll angle. Another set of terms for alignment is “roll, pitch and yaw”.

The third group of variables is the velocity variables *u*, *v*, and *w*, which describe the velocity of the vehicle in each direction. The calculus-trained portion of the audience will understand that velocity is the time-derivative of position. Engineers will sometimes use dots over *x*, *y*, and *z* rather than the variables *u*, *v*, and *w*.

The final group of variables is the rotational rates. Similar to the velocity variables, these are the rate at which the roll, pitch, and yaw of the vehicle are changing.

Whew, now hold onto all that math for just a moment more…

6 and 12 Dimensional fencing

My point is that you have complete control over all these variables when you’re fencing. You can hold your sword in whatever position and angle you want. You can move and twist it arbitrarily. Your speed and rotation rates can change. Each variable can change

throughout a particular strike. A shot that starts screaming toward your opponent's right foot can end politely tapping them on their left ear at a 45-degree angle. As you learn to do this you can move from a three to a six to a twelve dimensional fencer. Don't let the infinite possibilities overwhelm you. Next we'll discuss some ways of paring down your options to find the ones that are useful for a particular situation.

Lines of Attack – Low, Mid, High

First, let's start with breaking up the vertical plane. What I call a line of attack is probably more accurately a wrist and sword angle description. Later on in the course I'll discuss a "low" line attack to the forehead. But, in most cases my lines of attack should be easy to follow.

A classic en guard position and conventional thrust are examples of a mid-line attack. The sword is angled up and most shots will naturally rise from the initial position. A mid-line defense can get clean parries and beats against a mid-line attack.

A high-line attack moves the hand and wrist above the arm. I prefer to rotate into this line to the outside. I have friends who more often rotate to the inside. Generally, either results in a sword angled downward. This downward angle makes it difficult for a mid-line defense to land a parry/beat and stay on line because the swords are nearly parallel. A high percentage parry will require coming off line. High line attacks can be taken at any target including the feet. Watch your calibration with this stance.

A low line stance is a variation on the mid-line stance where the sword is dropped from in front of the bent-armed fencer to being more at his side with a straight arm. This stance helps to conceal your range and can be used to frustrate an opponent who likes to do blade-controlling beats and disengages. Like high-line attacks, attacks from this stance can force the opponent to come off line to get a high percentage parry. Attacks from here are a little slower than from a mid-stance, but speed variations (stutters) can be used as feints to get your opponent to commit to a defense before you're committed to an attack.

All of these stances can be exaggerated, sometimes with great effectiveness, by raising your arm above your head or dropping to a knee. It is also extremely effective to change your line in the middle of a shot in order to change their high-percentage parry into a low-percentage one.

Inside/Outside

Next, we can consider the horizontal plane. I think of the area between your opponent's shoulders as "inside". The rest of the area is "outside". Most often "outside" is on your main sword side; getting to the outside across your own body can be awkward.

The inside is where a very large percentage of SCA fencing takes place. Attacks and defenses are very quick and are the bread and butter of your drills, practices, and

competitions. You need to be good at the inside game. And you need for your opponent to know that.

Playing outside is easier for people, like me, with monkey arms. The length of my arms and blade allow me to more safely use up some of my range by not taking the shortest route to the target. Nevertheless, a good understanding of the outside game is important for everyone. Everyone should at least feint at an outside shot once in a while to open up the inside for a kill.

Football analogy

There's a football cliché that you have to establish the run in order to be able to pass. In fencing terms, getting your opponent to respect your inside game allows you the chance to sneak outside from time to time and make unexpected shots from unexpected directions.

But, stretching the football analogy, you need good pass protection to allow you time for your outside shot to develop. That means good off-hand protection to protect yourself while your sword is away from home. Some preparatory feints and beats to get your opponent out of position are also recommended.

Range

The final major component under your control is range. Atlantian armored fighters use the terms A, B, and C range. I prefer "close," "in," and "out". You're "out" of range if you cannot land a shot without over committing. You're "in" range if you can cleanly land shots. And you're in "close" range if you have to do contortions to bring your point to bear on the target. These ranges are very dependent on your size, stance, and blade lengths.

Quick Period Namedropping

All of the period manuals that I have seen spend significant time on the outside game. I commend Di Grassi, Saviolo, Fabris, Silver, etc to you. My lines-of-attack terminology owes a lot to Di Grassi's wards. And all of my outside technique spawns from long experiments with his middle ward. This concludes today's quick period namedropping.

Shot selection

The first step in selecting a shot strategy is to evaluate your opponent. While knowing more is better, a quick snap study can suggest possibly fruitful avenues to test. Data points to seek include their size, skill, mobility, weapons, and preferred techniques.

Muscle memory

Muscle memory is the term for skills that you have practiced and drilled sufficiently that you do not need conscious thought to use them. A good fencer certainly doesn't consciously think to throw most of his day-to-day parries. The hand and sword just do them. And it does them very quickly. These practiced, drilled, skills are your opponent's deadliest. You need to exploit them.

One approach is to identify areas where your opponent does not practice or drill much. Against a short opponent used to taller opponents this could be a low-line attack thrown from one knee. This could be fencing left handed, particularly against a natural leftie. The idea is to avoid the lighting muscle memory and use a technique that will require a much slower path through the brain for analysis.

Another approach is the pattern feint. Here you throw the same shot a few times in a row to exploit muscle memory. One approach is to throw the shot once, note the response, then throw the shot a second time intending to react in a useful manner to the response. I tend, instead, to throw the shot twice to note the response and program my opponent that I like that shot. After a brief moment to allow his brain to come into the loop to note the pattern and design an exploit, I'll throw a variant of the shot expecting the changed response. Now that their brain is in the loop, my third shot should land.

Try to avoid going head to head with their muscle memory. The skills that they've practiced probably work. You have to beat those skills with speed or treachery. The latter is the higher percentage option for most people.

Range

There are a number of ways to control, conceal, and exploit range. And it is very important to do so. Every non-newbie fencer should have a good feel for his opponent's range while that opponent is standing still in a conventional stance. The difficult trick is to keep track of it while you're both moving.

You don't have to make it easy. Simple range concealing techniques include retreating your sword to a low-line position while gradually advancing, or raising it while retreating. Other options include refused and semi-refused stances if you drill on moving into and out of them. You can even gain an inch or two of range by grasping lower on the grip of your sword (at the cost of some point control).

Ideal ranges to sit at are the "sweet spots" where your two ranges differ. A tall person with a long sword could be very effective against a shorter ranged opponent by staying at the edge of the out/in range line for himself. Similarly, that shorter opponent would have an advantage playing near their own in/close range line where the tall opponent is stuck in close range.

Range concealing and trickery can get you to your desired range, but staying there requires reliable footwork. Being able to advance, retreat, rotate, lunge and recover without getting tied up is crucial for effective use of range. A counter-intuitive observation is that often the person retreating has better control over range than the advancer. Patience and footwork practice can pay substantial dividends.

Skill exploitation

The types of shots that will be effective depend not only on your own skill but also on your opponent's skill. Each skill level from newbie, to beginner, intermediate, and ace will respond differently. You can get a feel for their skill level from their stance, their demeanor, the quality of their equipment, and the color of their scarves/cords/sashes (if you know how to read them).

The first thing when facing a new fighter is to decide that you're either going to win the fight or you're going to be nice and give them a chance. It takes a conscious effort for me to turn off teacher-mode and go into tournament mode. You're not deciding to be mean, just that your purpose for the moment is to win the round – or not as fits your mood for the day. But you need to make the choice. If you get frustrated by losing to a new fencer when you took it easy on them, then you didn't make your decision before stepping onto the field. The next thing is to realize is that the new fencer has no muscle memory. Everything will be a conscious decision and with little experience to base it on. They won't respond to small feints or fall for your latest uber-trick. Use your basic meat-and-potatoes form and you should win.

Mid-range fighters have varying amounts of experience and muscle memory. You can win by either pushing them out of muscle memory areas, by making their muscle memory do the wrong things, or by having better muscle memory.

Ace fighters have muscle memory to cover most situations. They're busy thinking about strategy and shot selection while their sword is off on its own protecting them. You have to get their muscle memory and justifiable confidence moving along the wrong road to exploit their skill level. This doesn't mean trick shots are the way to go; aces tend to learn very quickly.

I have a new trick shot (that I'm never going to make work again after describing it at KWAR) that to date has worked 100% of the time on Atlantian white scarves and 0% of the time on our lower rankings. It is a low-line shot from a knee that starts as a foot shot, then smoothly snaps into a thrust to the opponent's forehead. The reason it has this record of success and failure is described above. Our newer fencers see it coming, realize they can't deal with it and back out. Mid-range fencers see the low shot, void their feet out of the way, and then throw a parry just to be sure (which stops the rising snap shot). Our top level fencers are so confident in their muscle memory that they're planning on how to make me dead from my over extension and miss the quick pitch-up of the blade into the forehead they exposed when voiding their feet.

Preference denial

The main idea in preference denial is to not let your opponent play his favorite game. That favorite game is well practiced and solidly in their deadly muscle-memory-skill area. Rather, you want them to have to slow down, think, and do something they haven't practiced quite so much. And if you can get them a little frustrated rather than calm and collected, that will help too.

It's impossible to give much more guidance on this topic, so I'll just provide a few examples to get you thinking in the right direction. If your opponent likes to do lots of beats and disengages, you might retreat your sword to a low-line stance. If your opponent tends to like one-shot kills, bring your longer sword to the field to push him out of his favorite range. If he prefers a refused stance, stay out of range to force him into a blade forward stance.

Defenses to Goofiness

All stances and techniques have strong and weak points. Our "normal" stances are general purpose and are excellent choices for attacking and defending against other normal stances.

A "goofy" stance strengthens some lines at a cost. Examples include a "scorpion" stance where the sword arm is held straight up over the head, or a "prime" stance where the sword is held with the arm out and the point straight at the floor.

You have two basic options to respond to these stances.

First, if your opponent has even the slightest smirk on their face, take a high percentage one-shot lunge to their body or face while they're busy posing. They're expecting you to be confused and slow. Reward their error.

If they're not posing, then a high-percentage response to a goofy stance probably requires another goofy stance. Take a short step back and quickly analyze what they're doing. Look at their arm, body and sword position. Figure out which directions they've optimized their stance for. There'll be one or two shots that they can do very quickly. Everything else will be slower.

You can decide that your conventional lighting shot is better than their goofy one and return to plan A above. Or you can adopt a stance that protects you from their high-speed move. This forces them to take a slower move around your wall if they want to attack. If you can create this wall with your off-hand then exploit the areas that are unguarded with your main sword, then all the better. Recognize that they certainly have a level of muscle memory invested in their goofy shot and that you need to treat it as a serious matter to be successful against it.

Conclusions

I hope this course has expanded your horizons and will be useful to you in the future. I'd love to hear any feedback you have on improving the course. And I hope I haven't given my regular opponents all of my secrets so I never win another tournament.