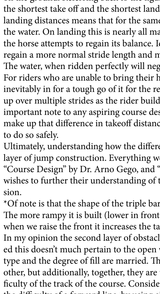
Better Course Inspections: Understanding Obstacle Construction

Peter Grant

As a course designer, understanding obstacle construction is integral to doing my job and achieving the desired level difficulty; as such I also understand what a complex subject it can be. Hence it is my hope to be able shed some light on the topic in order to help some of our junior and amateur riders get the most out of their course inspection. As course designers, we use the various aspects of obstacle construction to control and refine the difficulty or ease of a course by allowing us to have a certain degree of control over such things as rhythm, pace, stride length, take-off and landing distance as well as to a certain degree, the quality and shape of the horse's jump.

Granted the track along with distances are the largest determining factors in the difficulty of the course, but the various aspects of construction, those being fence type (vertical, oxer, triple bar, wall), degree of fill ('airy' vs 'solid'), colour and obstacle design, have huge influences on the difficulty as well, especially as we reach the higher levels. Indeed there have been many times in the history of our sport where the inherent difficulty of an obstacle has not been accurately assessed and thusly led to disastrous results when used with difficult distance questions. That being said, it is hoped that with increased education of riders and officials, these incidents will become more and more rare in our sport as we move forward. Safety withstanding, a contemplation of the various affects of construction should be as integral a part of any course inspection as walking the distances. For me every 'distance' is made up of multiple factors, including the construction, and a more complete understanding of these factors will lead to a more comprehensive course inspection, which in turn gives the rider every possible advantage walking in the ring.

The first thing to know about any obstacle is its type, those being vertical, oxer, triple bar, wall or open water. They are, of course, of upmost importance because jumping them is the whole point of the sport. However there is more to be considered than just getting from one side to the other. As most of us know, the take-off and landing distances vary depending on which obstacle type is being jumped, but for the sake of review I have included a figure illustrating the general principles. It shows the general relationship between the takeoff and landing distances for each of the obstacle types. It is also useful to consider how these measurements relate amongst the varying obstacles as well. In particular we need to know the following relationships:



TOv>TOox>>TOtb>>TOw and,
Lv>/=Ltb>Lox>>Lw.

This concept is important because the difference in the takeoff and landing distances between the different obstacle types, means that the obstacle has an effect on the quality of the distance. For example: 26m to a triple bar rides a lot further than 26m to a vertical as the horse must get closer to the triple bar for takeoff. Likewise, 26 m in a line from an oxer will feel longer than it coming a triple bar or vertical, as the horse lands closer to the oxer.

As a rider progresses up through the divisions, it becomes more imperative that they understand these differences, as the need for precision will increase dramatically in the ring. Not shown in the figure but of equal importance to riders who wish to progress to sporting levels is the inspection of water a wall. First thing to know with walls is that the jumping arc is much steeper than with a regular vertical. This is largely due to the horse over jumping in an extra effort to avoid contact with this solid obstacle. Translated this means shorter take off and landing distances than with a vertical. In addition, the relatively high spook factor that walls present to most horses means that they often negatively affect impulsion and stride length. The resulting compounded effect of the shorter takeoff and landing distances with the shorter stride length, is that any distance to or from the wall will ride much longer than it walks on the ground. Referring back to the figure, it is time to consider the open water. As we can clearly see it has both the shortest take off and the shortest landing distance of any of the obstacles. This resulting difference in takeoff and landing distances means that for the same distance, the horse has to cover around 1.5m more ground when jumping the water. On landing this is nearly all made on for the first stride after landing, as it can approach 5 m in length as the horse attempts to regain its balance. Ideally, the rider will shorten the subsequent strides quickly in attempt to regain a more normal stride length and more control.

The water, when ridden perfectly will negatively affect rideability in the ring, even for the best riders in the world. For riders who are unable to bring their horse's stride length under control within a few strides of landing are inevitably in for a tough go of it for the rest of the course. In approach to the water jump, the extra ground is made up over multiple strides as the rider builds the necessary energy to clear the width of the obstacle. This point is of important note to any aspiring course designers as anything less than 6 strides becomes very difficult for a horse to make up that difference in takeoff distance, and should be avoided until the designer's experience level is sufficient to do so safely.

Ultimately, understanding how the different obstacle types affect your take off and landing distances is the first layer of jump construction. Everything we talk about here after is building on these principles. I would recommend "Course Design" by Jessica Gegas, and "Give Your Horse a Chance" by Lt. Col. A.L. d'Endrody for anyone who wishes to further their understanding of this subject and their overall academic understanding of our sport and passion.

*Of note is that the shape of the triple bar will have a large influence on both the landing and take-off distances; The more rampy it is built (lower in front), the shorter the take-off and longer the landing distances are is, where as when we raise the front it increases the take-off distance and decreases the landing.

In my opinion the second layer of obstacle construction to consider is the degree of fill on any such obstacle. Granted this doesn't much pertain to the open water, or most walls, but for verticals, oxers, and triple bars, the obstacle type and the degree of fill are married. This may seem like an obvious statement as you can't have one without the other, but additionally, together, they are used to both modify the difficulty of each fence, and to modify the difficulty of the track of the course. Consider for example a 'filled in' oxer: For sporting levels, I can use it to enhance the difficulty of a forward line, by using either coming in to a line, leaving a line, or both, whereas for developmental levels, it can be used in the same manner to help educate young horses when introducing them to compression. To fully illustrate the affects of the degree of fill, I like to consider it on a scale. On one end we have what we refer to as 'airy', a term used to describe obstacles with limited amounts of fill, usually only poles, inside the jumping plane. In general an 'airy' fence offers very little spook factor and does not in itself affect rideability. However, it is important to realise that this is caused by a lack of respect for the obstacle on the horse's part, and that same lack of respect makes it not only more likely to hit the ground, but can take away from the quality and shape of the horse's jump. Furthermore, less fill means less for the horse to use as a reference for depth perception and to back itself off. This again adds to the likeliness of the obstacle being lowered. This also tells us that 'airy' at the end of the course is much harder than 'airy' at the beginning and therefore needs to be paid more respect by the rider. This effect is more accentuated with a vertical, as the back rail of an oxer helps give it some depth.

At the other end of the scale is what I consider to be 'solid'. For me, 'solid' is different from 'filled in' mainly in that for me 'solid', like 'airy', begins to add difficulty to the obstacle, though be it in a different manner. For me, the difference between 'solid' and 'filled in' is the massiveness or bulk of the fill. Take for example large pillars with heavy walls, similar to ones used at Spruce Meadows in the International divisions. These are perfect examples of the effect of solid fences: that they are hit less often, but can have an adverse effect on rhythm and pace. In addition, when a jump is 'solid' or 'spooky' it can adversely affect a sensitive horse's jump, as it may over jump vertically to avoid contact, and as a result land in a heap on the back side. This adds particular difficulty to the back rails of oxers.

In the middle of this scale is what I referred to before as 'filled in'. For me this is a jump that has at least four elements for its fill and usually something in addition to only poles. For example: a vertical with a top rail, two planks in the middle, and a rail on the bottom grabs the horse's attention, but without anything bulky and heavy that may back the horse off and disrupt your rhythm and/or pace. Moreover, it offers the horse more to look at in establishing its depth perception, and this, coupled with a little extra respect afforded by the horse usually results in a higher quality and more consistent jump. As mentioned before, obstacle construction encompasses a variety of factors that allow course designers to refine the difficulty of the course. However, the basic principles of the jump over the varied obstacle types, paired with the degree of fill are, in my opinion, the most important and influential factors in obstacles affect on your round. Recognizing varying influences of these basics of jump constructions, will allow the rider to generally improve the accuracy of his or hers inspection and preparation.

To this point we've discussed the fundamental points of construction and how they affect the horse's rhythm, pace, stride length and take-off and landing distances. Those points are the meat and potatoes of jump construction as they have a heavy influence, when coupled with the track and distances, on the overall difficulty of the course. Moving on the next layers of construction, I am going to look at the various 'spices' we, as course designers, can add to the course to make sure we have the perfect flavour. I am speaking of colour and the physical design of the obstacle. These allow us to extend the difficulty of the course, often in ways that don't disrupt the horse's rhythm or manner of going. They are simply used to increase or decrease the inherent difficulty of the individual obstacles, allowing the course designers to achieve the desired result with less severe distances and reducing the number of enormous obstacles on course. The result of this is a few 'unlucky' or 'cheap' rails here and there, but ultimately it does not lead to any issues with confidence or rideability, which lead to long term issues.

I believe colour is the first thing to discuss on this topic, as it plays a role in jump design as well. I am often asked by younger colleagues about which colours horses see, but for me, what colours they see is inconsequential. It doesn't matter if what they see when they look at red is the same as what I see. What are important are the other colours that are used with it, the footing, and the background, along with numerous other factors.

The first thing to consider is the horse's eyesight. We know that their vision is largely monocular, which is important because it greatly hampers their depth perception. This is important because colour can either help, or further hinder depth perception by increasing or decreasing colour contrast, not only within the obstacle itself but in relation everything around it. To clarify, by contrast, I mean from light to dark. Consider for example regular striped poles, as are seen at every event. When we paint a rail a solid bold colour such blue, red, or black and couple it with white, we've maximized the visual aid the horse can receive from the usage of colour. If we take either colour away, either the dark or the light, we've taken a large degree of the contrast away. If we're left with solid white poles on sand, or dark poles on grass, not only have we taken away any help we may have offered, but we've taken away all the contrast and have essentially 'hidden' the rails from the horse. Furthermore, the same effect can happen when the crowd or signage is directly behind the horse's view of the top rail.

Another question I am often asked about is the increased inherent difficulty of certain colours, namely yellow. I think to label any one colour more difficult can be misleading, but to a certain degree, it is true. If you think of colour contrast, again on a scale, you have white on one end, and dark bold colours on the other. As you move to the lighter colours on the colour spectrum, the contrast with white begins to reduce. By the time you get to lighter yellows and pastel colours there is very little contrast with white. Consequently, a yellow and white pole, jumps very much like a solid white pole. Similarly, if there are two dark colours together, they jump much like a solid dark pole. Worth noting is that in attempting to add contrast, it is possible to overdo the effect. Referring back to the example of rails, we know that generally adding colour will increase the ease of the obstacle. However, this can be over done to the point that it becomes confusing to look at for the horse. This will increase odds of the obstacle being lowered, as well as causing some horses to 'back off' on approach.

The last thing to consider when it comes to colours is the use of white to draw the horse's attention. One of two ways this is primarily used is with gates and planks. The closer to the ground one is placed, the more attention is drawn away from the top rail, which often leads to a deeper takeoff spot than desired, and as such, again increasing the likeliness that the obstacle will be lowered. Alternatively, I can use a plank closer to the top rail to draw their eye up for educational purposes; a very useful tool for young horses, especially in combinations. For me, this effect pertains primarily to the use of solid white planks more than anything, particularly when used close to the ground. Indeed gates are often used on first fences to offer a ground line. The second way white is used to draw attention is perhaps more subtle, but equally if not more effective. I'm speaking of what are referred to as 'mafia' rails. Many of our readers from here in Alberta are familiar with them, but if not, the term refers to rails painted with horizontal pinstripes, typically a bold colour with white. What happens here is horses see the bold white stripe on the front side of the pole and tend to jump the height of the stripe, as opposed to the top of the pole. Unfortunately there is not a lot riders can do to train for these tricks of the trade, but being aware of them will allow the rider to plan to be a little more careful at these spots on course.

The same way that jump type and the degree of fill are married, so too are colour and jump design. Every jump's colour and design work together symbiotically. Again, the most important thing to remember here is the horse's lack of depth perception. Essentially we can make any obstacle easier, or harder, depending on the level of 3 dimensional depths. That is to say the less 'flat' the obstacle is, the more material that is in front of the jumping plane, the better the horse can see it. The biggest effect this has is to 'create more space' from the jump, in other words, increasing the take off distance. This effect can be caused by anything, the standards, a groundline, the decor, even the fence numbers.

How does that translate to your course inspection? The main thing to consider is that for the most part it makes the obstacle easier when there is depth added to it by marginally increasing the take off distance, which in turn makes it less likely that the horse will knock it down. It may only alter the takeoff by an inch, but that often makes the difference between a 'cheap' rail and clear round. I did say for the most part it makes the jump easier, and this is especially true for developmental and young horse levels. However, once we start talking about the sporting levels, and start approaching the limits of the horse's physical abilities there is something else to consider: over wide oxers we can begin to make it more difficult by adding depth in front of the jump. By increasing the take off distance we are basically increasing the spread of the oxer. By the time you, as riders, reach that level, you'll be more than aware of that affect, but it's something to consider for the rest of us when watching. For the most part the more detail and depth we add to the obstacle, the easier it becomes, up to the point where it becomes busy and confusing to look at; at which time the obstacle can again begin to back the horse off when it might not be expected.

There are a couple other jump design factors that contribute to the difficulty of an obstacle that should be touched on as well. The first of these is the overall front width of the obstacle, from the outside of one standard to the outside of the other. A larger width obstacle makes the fence easier in two ways: first of which is in your approach. The wider the obstacle is side to side, the less the horse will look for a way around it. This is essentially the theory behind one of the FEI's rules on the front width of a water jump. They give a minimum width of 5m, with decor, in order to be more fair to the horse and rider.

The second way that a wider front width on a jump aids the horse goes back again to their vision. Horses have a blind spot right in front of them meaning that in the last couple strides before the jump they begin to lose sight of the top rail. In this case, if they do not have a sufficient groundline, they can use the standards in their peripheral to help them judge their take off spot. Not only does the front width of an obstacle play a big part in its level of ease or difficulty, but so too does the height of the standards. Similar to the way horses use the obstacles front width in their periphery to help with their take off distance, they use the height of the standard to help them gage the height of their jump. Typically horses are used to seeing at least 45 -60 cm difference between the top of the standards and the top element in the jumping plane. If the height of the standard is lower than that, it can cause the horse to misjudge the height of the obstacle. In the end, there are more aspects of the actual physical jump design than I could possibly cover, however, understanding the ideas of depth and detail will again further your understanding of the course, which ultimately is our goal.

Needless to say, the subject of obstacle construction is a complex one, as are so many other topics in our sport. However, being aware of the different aspects of it, and how they affect the horse's jump and manner of going, will greatly improve the accuracy of riders' course inspections and bring a much greater awareness of what is happening on course, and why. Suddenly questions like "Why does that line ride so much further than it walks?" and "Why is that fence coming down so often?" start to have answers. At first, analyzing obstacle construction can be a confusing and daunting task. However, by breaking it down to the layers discussed, applying the basic principles and adding to that some personal experience, riders can begin fine tune their course inspections.

Ultimately, as I said before, our sport is a complex one that requires much knowledge and experience. It is truly a sport where you can never stop learning. It's also a sport of precision where a single stride can make the difference in first or second place, or an inch can make the difference between the jump-off and going back to the barns. Every successful rider I know gives themselves every advantage possible to be successful and is thirsty for knowledge. Every rider that wishes to maximize their potential should emulate these characteristics, and they can start with having a better understanding of their course realize that there is a lot to grasp here, and that inevitably there are questions I will have failed to answer. If anyone wishes to further their understanding of the subject, and feels like I may be able to answer some questions for them, please feel free to leave your questions on our Pacific Equine Sport Facebook page, or send me a tweet to @PeterGrant1979.

Illustration borrowed from "Course Design" by Dr. Arno Gego.