

# Why Do Horses JUMP?



with Dr Andrew McLean

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**H**e will probably never jump again," many have often thought to themselves as they have just had a huge miss on course and landed their horse in the middle of an oxer. To our amazement, many horses come out and try harder next time, but others don't want to know about it and seemingly lose all confidence. There are some suggested reasons for why some will and some won't and Dr McLean will discuss them later.

Those of us who watch the Global Champions Tour and other major Championships marvel at the jumping talent on show. Horses like *Explosion W* (actually there are not many horses like him) are just amazing. The ease, attention and confidence with which they glide over the courses is mind-blowing. But the GCT is not an indication of the general standard of jumping around the world, it is the best of the best. Breeding, training, riding and even cloning is no guarantee that you will have a World Cup winner like Meredith Michaels-Berberbaum's, *Shutterfly* or European Champion Martin Fuchs' *Clooney* etc., so what is it? To be perfectly honest, no one really knows. Of course, it is a combination of a lot of things and isn't that the fascination of showjumping? The following discussion makes some suggestions as to jumping success and why some horses do what they do.

"I often wonder how much of the horse's attitude to jumping can be explained by early conditioning or temperament," says Dr McLean. "Breeding, training and the rider are all very important, but, if they don't want to jump, you really cannot force them; you can only go so far by force. I really think though, that some horses actually enjoy jumping. The trouble is, when it comes down to it, it is very hard to measure if horses enjoy things, because they are more subtle in expressing their feelings than other animals like dogs for example. You can get a feeling about it, and that is all good and well, but in the end, at best, it's an educated guess. There is a study, however, that shows that jumping-bred horses are more likely than dressage bred horses to choose to jump an obstacle rather than go around it before they get any training, so I think there is a fair bit in selective breeding of the jumping horse because after all, we've been doing it for almost a century.

"I trained a lot of horses to jump for many people, more for eventing than showjumping, and I found that if I shaped their jumping response gradually, didn't over face them and let them gradually learn, it proved successful. Start with small jumps and gradually get bigger. Also giving them a lot of diversity in the jumps at the very low level, I found almost every horse is happy enough to jump up to say about 80cm or even a metre, but after that, some are less motivated. The ones that won't even go over a rail on the

ground has more to do with problems in the go button than the horse's distaste for jumping. The really good jumper keeps going and pricks his ears and even despite the odd mishap, keeps jumping. Others let you know they are not interested to go beyond that point. We never jumped the heights in eventing that they do in showjumping, but we certainly jumped some very wide, nasty looking and imposing things especially in the earlier, less regulated days.

"Horses have such extraordinary recognition memories. They remember everything about the contextual aspects of what and where you train them so that you have to be careful to ensure that you gradually change the context of the obstacle. If an obstacle has multiple characteristics such as a drop into water, it makes sense to school the drop and water separately, then add the two together when they are comfortable over the separate obstacles. If you change everything too quickly, that's when things can go wrong. With this in mind, it's important to school over the same obstacles in various places as the scenery to the horse is completely different and in training, you have to extract the scenery from the obstacle so that the horse generalises about the obstacle. The scenery around and behind the obstacle is different, therefore to the horse it is a different task. It just shows how context-specific they are. When horses learn to do things, they remember the precise

visual picture of the obstacle. If you have schooled your horse over a water jump at home successfully, it does not mean that the horse is now OK with water jumps. It is just OK with your water jump. You need on average about five different water jumps for the horse to become accustomed to the water being the common denominator and is therefore happy to go forward in, to or over it."

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What about the horse that continues after landing in the middle of a show jump oxer? "If the horse pulls backwards when he finds himself in this situation, he is more likely to not want to jump it. If however, he jumps forward after landing in the oxer, jumping it is usually not a problem in the future. I always found that interesting and rather telling about the horse's mind. Also, once a horse has had a lot of practice at stopping, the retraining process is more complex, not impossible, but more complex. If you have just one stop and realise the problem and start to reshape it, you can usually get over it easily. But if they have had multiple experiences of stopping, turning away and having another go, it's a problem. The horse learns that the answer to the problem is to turn away. And when he looks away, he goes away in his mind, like toddlers think when they put their hands over their eyes. So for the jumping horse that is why I don't advocate turning away and punishing them when they stop. What happens when you do that is that you create more flight response, more tense associations with the jumping arena and while they may very well scoot over the fence, they do it for the wrong reasons: fear. Fearful horses jump wrongly, they jump hollow and don't use their shoulders and backs properly. And it doesn't train them to jump the next similar fence they encounter. It is better to not let the horse turn away and lower the obstacle so that the shape is the same, but the effort is well within the horse's capability, so he can make the choice of going forward over it rather than around it. You cannot do that in competition of course, but at home you can set gradually more challenging tasks that can be easily altered/lowered, so that you can go forward over them.

"Momentum really helps in a 600kg animal to keep it going and jump. If the rider allows that momentum to stall, the horse is less likely to keep jumping. The



Martin Fuchs and *Clooney 51* at the Longines FEI Jumping World Cup™ 2019/20 at Equita Lyon 2019 (FRA).

Photo: FEI/Eric Knoll

momentum of the horse is a result of its body speed across the ground which in turn is a result of the combination of stride length and stride speed. The power for the jumping effort, however, is much more to do with the speed of the stride, in other words, the tempo of the gait in beats per minute. Horses that are going to make good showjumpers at a high level tend to be fast in their stride and short in the back. Long striding horses which are often longer in the back are good for galloping and staying, and good for jumping wide obstacles but not necessarily high jumps. To my mind, the ideal horse for showjumping is the short strider typically wither high rather than croup high. Long striding horses often

have difficulty achieving a showjumping tempo above 100 bpm (unless they are really galloping), and slow legs mean they have to put in a more powerful effort for every jump because they do not have the advantage of the faster legs doing a 12-foot stride (3.6m) on the approach to the fence and coping well with a deep take-off point. You would see the importance of the speed of the legs if you just stand still and try and jump upwards with both feet. You would notice that the faster you jump upwards, the higher you get. That's the power from limb speed.

"Like throwing a ball in the air, every obstacle a horse jumps involves a loss of momentum in the air phase and on landing. So the good rider is adept at



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correcting the tempo immediately and it is also why you often see strong bits used, because the horse that is always accelerating will more easily pick up his own tempo on landing. A very skilled rider though, is able to train the horse to travel in a softer bit, and accelerate a little on landing to pick up the tempo. This loss of tempo which is around 2 beats per minute, is critical in a double or treble, because the horse can lose around 6 bpm after the entire combination.

“What is interesting from a scientific point of view when horses jump, is that it is all about the law of kinetic energy (the energy something possesses due to its movement). Any object in motion has kinetic energy. Basically, the law of kinetic energy says that when you double the speed, you quadruple the energy. For instance, let’s say a car is going at 10kms an hour and you hit the brakes, the skid mark will be say, 1m long. If you are now traveling at 20kms an hour (double the speed) and hit the brakes, the skid marks will be 4m long (four times as long). This is why canter stride tempo (speed of the legs) is so important in jumping, because small increases in speed give big increases in power. Biomechanics tells us that the speed of swing phase is proportional to the speed of stance phase. If the speed

of the legs is too slow in swing phase, the power is reduced in stance phase. So apart from momentum, much of the power comes from the tempo. If the tempo is too slow, the horse has to rely on pure power exertion at the base of the fence and that can be very energy-expensive throughout an entire jumping course.”

So what is the optimal speed for jumping high fences? “It turns out that the optimal tempo is typically very narrow. It is between 105 and 115 bpm, with an average of 110 bpm. Obstacles that are higher than 1m generally require this tempo of around 110 bpm. Too slow and the horse loses power, too fast and momentum takes over and the jumping trajectory is converted into length rather than height. Skilled jumping riders understand kinetic energy without necessarily knowing what it is. They have a feel for the right tempo for the particular horse. I have measured tempos at top international shows around the world in Europe and the USA and I have also measured it at Olympic Qualifying Horse Trials Events here in Australia in the showjumping phase. It is remarkable that almost all of the top horses have an average of 110 bpm in the showjumping and top riders know the feel of it. Tempo is easy to measure with a metronome

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Rowan Willis and *Blue Movie* at the 2018 WEG at Tryon, USA.  
Photo: Equestrian Australia/Cara Grimshaw

available on iPhone and Android. When I was living in Virginia, USA, I went to the Upperville Horse Show. In the ‘Newcomers Grand Prix’ event, the tempos of the horses were sometimes too slow at around 95 to 100 bpm, leading to disaster, however, in the Championship Grand Prix event, tempos averaged 110 bpm quite accurately. I first discovered these tempos in 2012 when I was doing a demonstration in Italy for RomaCavalli, big expo and in the evening they had a Nations Cup Qualifier and I was invited to dinner at the VIP table. I couldn’t speak Italian, so I basically sat there and wondered about the canter tempos, maybe because I have a piano background (not brilliant). So I downloaded the metronome app there and then, and measured all the canters during the showjumping - I was stunned to see the results. And I have been doing this ever since.

“Of course, in showjumping and eventing, some fences require a longer rather than higher jump effort (such as water or big ditches), whereas others require both (triple bars, tiger traps). Good jumping riders know that a 1.60m vertical will require a different pace from a 1.60m triple bar and they learn and get a feel for just what canter they need for the fence they are approaching. During my eventing years, I used to walk my course and note the fences that required showjumping speed, middle speed or galloping on. That enabled me to utilise the spaces I needed to gallop fast. 40 years ago, the speed for Advanced eventing in (one day events) cross-country was 600 metres per minute which is really cracking-on, so working out your galloping places was crucial. These days there are more technical fences than back then, so the need to gallop where possible is even more necessary.

“Training is very important in whether or not a horse jumps, but no matter who the trainer is, not all horses jump like *Explosion W*. You cannot artificially create the carefulness and scope of the modern showjumpers we see at the Global Champions Tour. They are just like that; freaks if you will and despite the tens of thousands of horses bred each year, there are very few super horses produced. *Explosion W* is by the popular *Chacco-Blue* that was a brilliant jumper himself and he sired *Chacco’s Son* (Maurice Tebbel), *Chacco Kid* (Eric Lamaze) and Rowan Willis’ *Blue Movie* as well as a reasonable list of 1.60m horses. But how many horses has *Chacco-Blue* sired? Despite the sires getting all the publicity, the influence of the dam is very important and highly underrated as it is in horse racing as well. Mares provide more DNA than stallions because mitochondrial



Simone Blum and *DSP Alice* at the 2018 WEG at Tryon, USA.  
Photo: FEI/Martin Dokoupil

DNA is inherited exclusively from the mare. Mitochondria are considered the powerhouse of the cells that produce energy and they have their own DNA. The mother’s energy system is inside every single one of her cells. The sperm is a package of genes but does not include the sire’s mitochondrial DNA. So the mare is of particular importance in breeding for athleticism and power. There are studies on racehorses that show that a great sire over a poor performing mare typically has slower offspring than a poorer sire over a great mare. *Explosion W* is out of a mare by three-time World Cup Champion, *Baloubet du Rouet*, whose dam was a Thoroughbred. Thanks to modern veterinary science we are seeing mares more and more in top competition. In fact, at the 2018 WEG, a mare, *DSP Alice* (Simone Blum GER) was World Champion and Steve Guerdat’s *Bianca* took the Bronze medal. The winning USA Team had three mares, including the former *Gabi Kuna-Chugg’s Cristalline*.

“It is an interesting question: what makes a jumping horse? The more careful the

horse is, the more careful you have to be with its training. The really good showjumper just does not want to touch a rail, you don’t have to teach them, they are generally just super careful from the very start. At the Schockemöhle barn in Germany, they watch all the foals over a cross-rail in the indoor and watch them negotiate puddles etc in the paddock to see their reaction. Did the Champion jumper hit its legs on the rail as a foal and think to itself, I’ll never do that again? The trouble is, a very careful horse can be easily frightened and they can also be quite difficult horses to deal with. *Shutterfly*, for instance, required careful management and expert riding. Apparently, *Explosion W* is difficult to mount and Ben Maher cannot sit on him and change his jacket, nor can he sit on him with a rug over his back. You might say perhaps some of this is explained by learning, but nonetheless, these horses are still highly reactive.

“I don’t think it is anthropomorphic to say that some horses are much braver or bolder than others, because you can see

it in the horses from the moment they are born. I had an Advanced Three-Day-Event Thoroughbred stallion, *Woodmount Magic* that I sold to the UK back in 1995. I had this horse as a weanling, and he was the boldest horse I have ever had. He just never said no to anything. During his foundation training, I took him to our water complex for the first time and he just went straight in. In fact, no obstacle during the training of cross country or jumping ever caused him to stall or stop and he was always super calm. Some horses are just bolder than others. So character does come into making a great jumper and if they are bold, careful and scopey, you have the ultimate trifecta.

“I think that the trait of boldness in domestic horses has changed as a result of selective breeding. If you consider the evolution of horses and other flight animals of the open grasslands, there is a kind of boldness scale; at one end is curiosity and at the other, fear. In all grazers, there has to be a balance of that, because in the wild habitat, if you are too curious, you get eaten because



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you graze too close to the forest or rocks where predators might lie in waiting. On the other hand, if you are not curious enough, you don't get enough to eat compared to the bolder ones. The fearful horse would shy and run off at almost everything. Animals in the wild have a narrower balance of boldness and fear. So what we have done in selective breeding is to tease that out and through selective breeding, make some horses more bold than others. Often it has been an accident, because we have selected for certain things, like speed in a racehorse, or colour and with these traits, other traits have been dragged along as well because many genes are linked (one comes with the other). For example, a Russian scientist many years ago decided to breed silver foxes for tameness. He crossed only those silver foxes that showed curiosity and no fear of humans. What he found after a number of generations was that not only did the foxes become tamer, but the coat colours changed with black and white variations as well. It is not difficult to imagine that with all of our domestic animals from pigeons to pigs, as we selected for tameness, we inadvertently got different colours. So it is highly likely that the tendency for habituation and boldness came together with other traits that we selected for. So as we have tossed the coin many, many times in selective breeding, we see that the best jumpers and movers are more hot and spooky now, and often far more difficult to ride and train, which is quite a conundrum for the modern dressage rider. For the showjumping rider, it is not such an issue because there is no dressage test, however, this explosive temperament can be problematic for the keen but less effective amateur.

"Conformation should be of great importance in producing the performance horse for particular horse sports, but it does not seem to have as supreme an influence as one might imagine. Some seemingly perfectly conformed horses won't jump and others with less than perfect conformation are champions. **Ludger Beerbaum** says of his successful mare, *Chiara* that; she does not have ideal conformation, she has short legs and is rather straight behind. I don't look at the papers, he says, she is a good character, mentally strong; a bit of a freak really.\* Similarly, **Ben Maher** says of *Explosion W*: "his great strength is his brain. He is sensitive and brave, enjoys what he does and believes he can do anything.\*"

"So it appears that it is the mental strength, the few inches between their ears, that is of great importance to make a good jumper. And the problem with selective breeding for mental traits, is that it is just

Ben Maher riding *Explosion W* at the Longines FEI Jumping European Championship.

Photo: Dean Mouhtaropoulos/Getty Images for FEI



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as difficult as it is for physical traits. Almost all of the mental and physical traits that we desire in performance horses are not controlled by single genes but rather by many genes (polygenic inheritance). In fact, it is well known in quantitative genetics that almost all of the traits that we want, have low heritability scores (conformation, movement, jumping ability, speed etc). So it's a matter of tossing the dice over and over and as we breed champion to champion we gradually find that the traits we want to become a little more likely to appear, though the chance of a 'dud' still looms high.

"The downside of this is that success in breeding for top performance has an enormous cost in animal welfare. This is because it always results in a limited gene pool due to the impossibility of avoiding inbreeding. Inbreeding, otherwise and euphemistically known as 'line breeding' inevitably comes with a raft of disabilities and imperfections that would never happen when nature is left to its own devices. Of all of the pure dog breeds, there is not one that has no associated congenital disease or dysfunction. The same goes for horses, which is why we see

poor feet in Thoroughbreds, as well as temperamental and physical abnormalities in all breeds of performance horses. To the horse lover, it looks easy, we just keep breeding champion to champion and performance just gets better and better. But the truth is more sinister. We will never be able to control the expression of all the genes in the horse, as there are almost 3 billion base pairs of DNA and already we have over 90 hereditary diseases identified. This is the conundrum we face in all selective breeding in animals for food or performance. We should be careful what we wish for!

"But I digress. Getting back to our initial topic about what makes a horse want to jump, it's clear that there is a lot we don't know about the world. We can investigate it as thoroughly as we like, but we really don't know what makes one horse want to jump and another not, apart from its history. Given the same breeding and training, some horses will shine through and others won't. Really, it's a great mystery why horses jump and I for one think it's a wonderful thing to still have some mysteries in our world." 🐾

\*World of Showjumping.