Laterality
The Crooked Horse Syndrome, Part One
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"You may not know it, but you are probably riding a crooked horse."

Laterality. What is it? What does it mean to you as a rider or trainer? How does it affect balance and athletic ability? Are many horses affected by laterality? Can it cause unsoundness in a horse? What can we do about it? These are questions that might come to mind when you read the title of this article and these are the questions that I want to address. The topic is enough for an entire book, but let me at least introduce you to the subject.

Using the human biped as an example and a starting place, laterality is the state of being right-handed or left-handed. But, we are not just hand dominant; we share that dominance with our eyes, our shoulders, our legs and our brains. To understand the physical effects of such dominance, we must talk about balance. Balance in our bodies is what we need to survive. It is what keeps skyscrapers and bridges from falling. It is critical to athletic ability and performance. It is also necessary to prevent injuries. Think of the people doing extreme sports, such motocross, extreme skateboarding, extreme snowboarding, bull riding, or other endeavors such as gymnastics, ballet or Olympic diving. These people require exquisite balance and they need to be equally strong, skilled, and trained on both sides of their bodies.

The state of being markedly right or left-handed is the enemy of balance and athletic ability. The more right-hand dominant we are for example, the more difficult it is even to write our names with our left hands. Add to this the fact that we may also be right-eye and right-leg dominant and we are, overall, less coordinated on our left sides. Therefore, typically, if we start to stumble, we catch ourselves with our right leg. If we further lose our balance and fall, we tend to break the fall with our right arm. Highly right-dominant people, unlike star athletes, are awkward when they attempt to throw or kick a ball with their left limbs.

Now, how does this pertain to the horse? It all starts with the biomechanics of the horse in its natural state. The horse evolved to eat forage at ground level. If he had the choice, this is what he

would do for 17 to 20 hours each day. To be able to graze comfortably for most of the day, the horse developed itself to be very significantly "on the forehand." Approximately sixty percent of a horse's weight is borne on his front legs. These limbs are, almost literally, pillars that support and balance the weight of the head and neck in a grazing posture. The hind limbs are designed to move the horse forward to the next blades of grass. As the horse moves a hindlimb forward, a front leg must also move forward to prevent the horse from stumbling or falling on its nose.

When it comes to the posture and the biomechanics required for athletic performance, however, the state of being on the forehand is strike one against the horse. When we train horses for performance, we require them to shift their balance to their hind limbs, or lighten their forehands.

Like people, horses are born either right- or left-handed (having a "right or left forelimb dominance.") Most horses, like most people, are right-handed. This means that 75 to 80 percent of all horses will use the right front limb as the primary support limb. They will very often graze with the left forelimb advanced in front of them, the right forelimb straight up and down, or slightly rearward, and the right hindlimb slightly advanced. To understand the basis of this we have to examine and contrast the role of a forelimb dominance in the quadrupedal horse vs. handedness in the human biped. We must examine the biomechanical differences in the way that the horse uses its body verses the way a bipedal human uses biomechanics.

Riders, trainers, vets, farriers and body workers all recognize that horses have an "easy side" and a "difficult side," which is sometimes described as a "hollow side" and a "bulged side." The left side is more typically the "easy" side. *A horse with a right dominant forelimb finds it much easier to pick up the left lead because he preferentially uses his right forelimb for support, thus freeing the left leg to pick up the canter lead*. Thus, the right-handed horse is generally more difficult to the right because of the dominance and stronger supporting function of his right front limb.

If strike one against the athletic horse is his natural state of being on the forehand, strike two is that horses in their untrained or natural state are not designed to move well in small circles. How often do you see horses in an unconfined natural setting go around in true circles? The

biomechanics required for circles are quite different from those required by the horse in its natural setting. With those considerations in mind, we must ask the question, how are almost all horses "started?" Most are started in a round pen or by longeing. These techniques can be valuable if one understands the biomechanics and how to use the pen and longe line to lift the dominant shoulder and make it as free as the non-supporting shoulder. (The biomechanical changes that we must create and the mechanics of the groundwork will be discussed in Part Two of this series.)

All that you have read this far pertains to the "Natural Crookedness" that the great riding masters of the 15th, 16th and 17th centuries described in their writings. The natural crookedness of the horse is the enemy of straightness. It's an old adage that "a straight horse is a sound horse." The corollary to this is that a crooked horse is either unsound already, or on its way to becoming unsound. One of the primary goals of the classical riding masters was to create balance and straightness and minimize crookedness. It is generally not possible to eliminate crookedness altogether. Horses and people are alike: we can become more ambidextrous, but we will always retain some elements of our right-or left-handedness.

Perhaps the greatest difference between the riding masters of old and those of today is that *the classical masters generally achieved straightness and self-carriage by training the horse from the ground, before placing a rider on its back*. They achieved balance through careful in-hand work, longeing techniques and work between two pillars to change the horse from a "leg mover" to a "back mover." They worked to shift the horse's center of gravity to the rear and developed the core and abdominal muscles so that weight was taken off the forehand. The horse would then no longer be using the right forelimb for its support, but would be able to lift either shoulder and become more ambidextrous.

How does crookedness affect soundness? Every horse that exhibits any significant degree of laterality throws its center of gravity off the midline when it moves. Liken this to the human gymnasts who somersault off the "horse." They are supposed to land in perfect balance with equal weight distributed on each foot and then take a bow. But even at the Olympic level, many gymnasts who have right arm dominance have to catch themselves with their right foot and take an extra step, for which they are then penalized. Repeat the problem enough times and pathology

will occur at the musculo-skeletal level. *If we want to make our horses straighter and keep them sounder, we need to go back to the lessons of the old masters and find techniques that can minimize their laterality.*

As an equine health care professional who deals with the consequences of lack of balance and coordination, I think laterality is a fascinating and important topic. I have worked with biomechanics, gait anomalies and soundness issues for over 35 years, but only in the last few years have I come to recognize that much of what I see and treat is the result and direct consequence of "natural crookedness."

The greatest percentage of my practice now is acupuncture and chiropractic work. My background for the 25 years prior to going into integrative medicine was conventional medicine with an emphasis on equine sports medicine. The physiology and pathology of muscles has always been a focus for me. The first manifestations of early performance and subclinical lameness issues can be found in the muscle system. Next, they appear in medium density tissues such as tendons and ligaments, and finally at the third level, in the joints and bones of the horse. However, treating the problems, even when they first appear in the muscles, does not answer the question of why there are problems. To understand the pathology, we must first identify the underlying source of the problem.

Before I institute any treatment, I recognize that I must examine the "whole horse." This means I perform gait analysis as well as the conventional palpation of limbs and so on. For the past several years, I have noted that the muscle and chiropractic *patterns* that I see are essentially the same whether the horse is a reining horse, a jumper, a dressage horse, a polo horse, a barrel horse, an endurance horse or even a trail horse. I expected that every discipline would show muscle patterns specific to that horse's use. But this is not the case. I see the same muscle patterns expressed in 75 to 80 percent of the horses, and the mirror image of that pattern expressed in the other 20 to 25 percent of horses. So essentially, I see the same muscle patterns on essentially 100 percent of the horses.

Moreover, I also find the same chiropractic patterns in horse after horse. From laterality one can usually predict which limb will likely suffer tendon strain versus suspensory strain, which

foot will first show navicular or “posterior heel syndrome,” and so on. Even ultrasound images and X-rays show a tendency for the same patterns of joint disease in the lumbar area of the horse’s back.

There has to be a common denominator, and this common denominator appears to be laterality. Problems arising from laterality can be found in horses at all levels of training and use. These patterns are even prevalent in upper level horses, regardless of their sport. We spent time in Germany this past summer where we attended a large premier horse event. We watched all the dressage Grand Prix classes. From the stands, it was obvious that the majority of these top level horses from all over Europe were plagued by laterality problems, that became most observable in the passage and the pirouette. If I had access to the horses, I am sure I could demonstrate consistent muscle patterns in every one of them.

The good part of the story is that, with a team effort of good riders, trainers, veterinarians, farriers, and body workers, we can do a very good job of helping maintain the performance and soundness of horses with laterality problems. *Note that I use the term “maintain” rather than correct or “cure” the problems.* We cannot accomplish a cure, no matter how good our therapy is or how thorough and diligent we are. Closeness to true correction can only be accomplished through work that changes the biomechanics of the “natural” horse to those of the “riding horse.” The goal is to move the horse in the direction of ambidexterity. An ambidextrous horse will need fewer visits from the veterinarian. The horse will also be more pain free and will stay sound significantly later in life.

The Crooked Horse Syndrome, Part Two

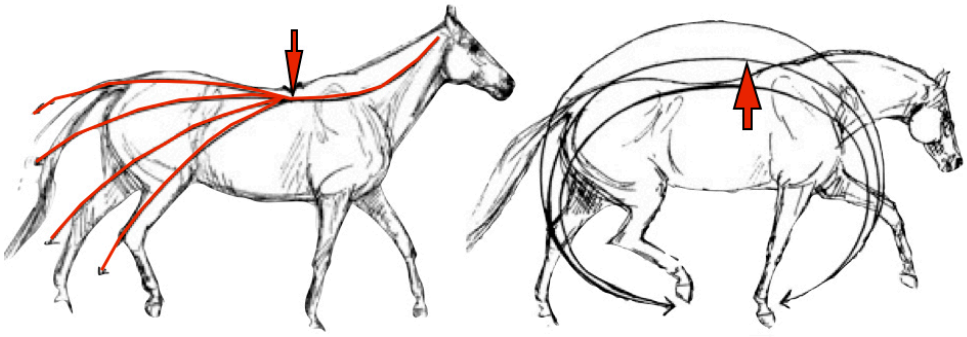
As a very brief summary of part one, we recognize that every horse is born with some degree of inherent crookedness, primarily associated with right or left handedness that is better expressed as right or left forelimb dominance. The limb dominance is of small consequence to the horse in nature and actually helps keep the herd packed together when in flight. It fits for its grazing lifestyle and its inherent “fright and flight” survival mechanisms. Thus, the natural horse with its natural set of biomechanics lives a a long and good life. It is sometimes a difficult life

with regard to lack of food supplies and the prevalence of predators and, of course, it eventually it meets its destiny as part of the food chain.

When we turn this horse from its nature to a riding animal that must bear weight on its back while performing the tasks we require, we encounter three strikes that we must deal with. One: the horse in nature is genetically designed to be on the forehand for grazing. Two: it is not, by nature,designed to go in circles, especially small ones. (Note that almost all horses are started with longeing or round penning where the circles are small. With correct training they can learn to go in small circles and be balanced) Three: possessing a significant degree of right or left limb dominance is antagonistic to athleticism.

When we compare the posture of the horse in its natural state with the horse with the posture of the "trained" athletic riding horse, we observe that the horse in nature travels with its back hollow, and its head elevated. There is minimal engagement of the hind quarters and at speed, the hind feet remain in the push phase for a longer time before retracting to commence the next stride. That is to say that the there in no engagement and little impulsion present.

The postural biomechanics must be altered in order for the horse to become, balanced, engaged, athletic and remain sound. The natural hollow, "down-swinging" back is amplified by the weight of the rider; that is to say that the horse becomes locked into a hollow back, and in an "on the forehand" way of going. *The biomechanics and use of different muscle sets must be changed or the horse's performance level, its useful life and its long term soundness will be seriously compromised.* In order to deliver an athletic level of performance while carrying the weight of the rider, the horse must be trained to move in a state of relaxation (i.e. lack of tension), with rhythm, impulsion, and a free "up-swinging" back. Without these the horse's days of soundness are numbered.



(Natural Horse with Down-swinging Back) (The Athletic Riding Horse with Upswinging Back)

Posture is the key to balance. *Balance is keeping the center of mass always in dynamic equilibrium with gravity.* The key to posture and balance is proper use and development of the correct muscle sets. We must realize that the joints (including all the tiny joints of the spine) only function correctly because of proper action of a given set of muscles.

In the ridden horse, significantly different sets of muscles are required verses the horse in nature. The muscles that are required of the athletic riding horse must be symmetrical and of equal tone on both sides of the body. *In the horse that exhibits right or left forelimb dominance, they are neither symmetrical nor equal in tone.* Thus as much laterality as possible must be extinguished.

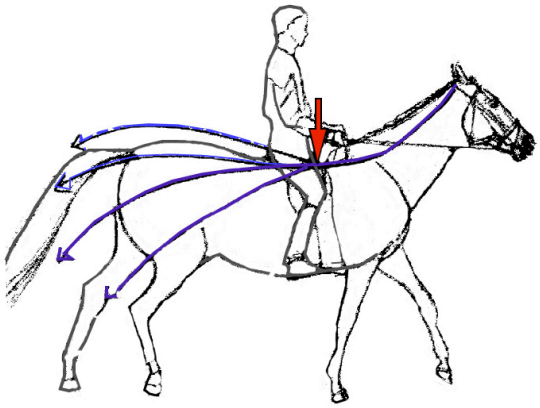
In my work as a performance horse oriented veterinarian, I have become acutely aware of the muscle imbalances, asymmetry and painful muscle patterns associated with essentially all horses. It was thus that I sought more insight. Though I recognized the patterns, I did not truly understand the implications of the forelimb dominance aspect. In the past year, I and my wife, Christine, had the opportunity to work with Klaus and Gabrielle Schoneich at their facility "The Center for Anatomically Correct Horsemanship" near Dusseldorf Germany.

Through recognition of the work of the riding masters of the old world, Klaus and Gabrielle Schoneich, have made it their passion to understand how to start young horses and how to rehabilitate horses. They have, for the past twenty-five years, trained or retrained over 5000

horses to overcome the obstacles created by laterality and to acquire balance, coordination, and harmony between horse and rider.

The first, and today often forgotten, principle espoused by the riding masters of past centuries was that the horse must be balanced and be adequately developed to carry the weight of a rider before being trained under saddle. *It is nearly impossible to significantly extinguish laterality and create a proper "upswinging back" by in-saddle training prior to proper development of the unmounted horse*. In other words, *straightness*, *while unmounted, must come before mounted training*. The Schoneichs take many upper level horses, whose careers have prematurely ended, back to their particular system of basic ground work (as if they had never been ridden). This period of retraining is typically in the neighborhood of three weeks duration - sometimes longer. They are then re-trained under saddle, with, what I would call, remarkable results. Many of the "unsoundness" issues that concerned me as a veterinarian resolved without veterinary interference or use of medications.

(the result of riding/training before the horse has the strength and balance to carry the rider)



Even More Heavy on Forehand - More Hollow Backed - Head Elevated - No Engagement - No Impulsion

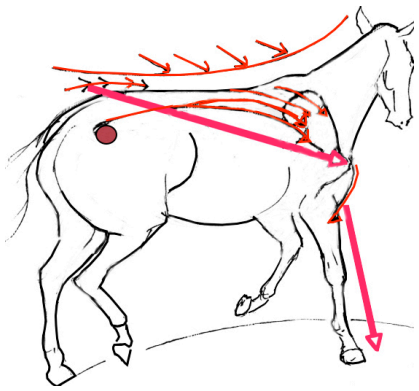
With this background, let us look at some of the biomechanical issues that must be addressed. Most of the problems that arise are associated with two major forces - *shear force* and *centrifugal force*. *Shear force* is strain within the structure of a substance produced by pressure that shifts structural elements laterally in relation to each other (i.e. thus, shear force on joints, ligaments, muscles). *Centrifugal force* is force that acts outward on a body moving around a

center, and arising from the body's inertia. An example is swinging a ball with a string attached around in a circle. The horse, in motion, must then, brace against any centrifugal forces.

In the case of the natural horse, the force is driven via the shortest route (in the case of the right dominant forelimb horse) from the left hip to the right shoulder. In the simplest terms, this creates *shear force* through the horse's sacro-iliac joints and through the vertebral joints of the loin and thorax as well as creating shear strain in the stifles and hocks. *This force moves the center of gravity off of the midline and to the right*. Balance of movement is then impaired and agility is lost.

Moreover, it acts, especially on the hind quarter to create a *centrifugal force* that the horse must brace against. The force driven into the right shoulder and limb cause it to be less mobile and act as a post or pillar around which the body must rotate and thus adding this centrifugal component. The larger and the stronger the hindquarters are, the more the shear force generated. Thus, typically, the right forelimb dominant horse finds it difficult to turn to the right, but easier to the left. It can pick up the left lead more easily, but in the process, tends to fall onto the left shoulder (and "pop" the right shoulder outward due to centrifugal forces placed upon it). To get the feel of this, try walking with a cane in your right hand acting as the right forelimb. You will note the tendency of your body to somewhat swing around the cane each time you plant it on the ground and move forward.

(Forces driving form the left hip into the right shoulder)



The shear and centrifugal forces cause the muscles to develop unevenly from side to side. This results in a crooked horse. A straight horse (one that tracts with its feet in line whether

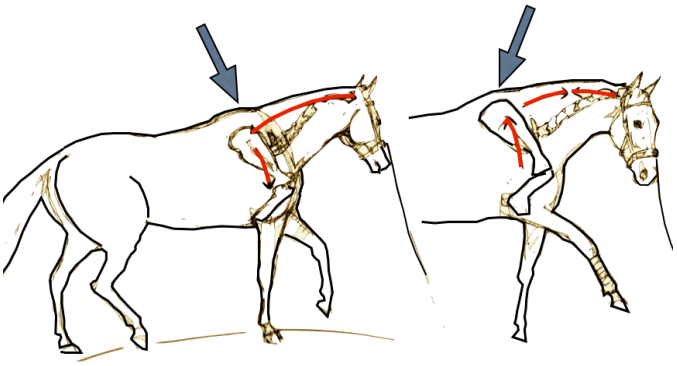
turning or going straight ahead), is, per the old adage, a sound horse. It is an established fact that a crooked horse will not remain sound.

So how does one go about creating a balanced horse. Try these two simple exercises. If you are right handed, visualize yourself throwing a ball or a football. Note how your balance and support moves to your left leg and foot when you raise your right arm and shoulder. Now let your shoulder literally drop forward and downward toward the ground. When you now attempt to throw the ball without being able to lift your shoulder, only freedom of your forearm remains, and your throw is seriously impeded. This is precisely what happens to the horse whose forelimb is grounded by the forces traveling from the hind limb into the shoulder.

Next visualize yourself kicking a soccer ball. Again note that you shift your weight and balance onto your left leg, and as in the previous example, you raise your right shoulder as you kick. Then, again, allow the direction of force of your right shoulder to push toward the ground and repeat the exercise. You will see how much your ability to bring your right leg through and kick the ball effectively is restricted. *The horse cannot extend its gait, and it cannot follow through with its right hind leg when the force of the shoulder is toward the ground.*

Thus, the biomechanical secret of balancing the horse and preparing it to properly use its back, is to reverse the direction of thrust - i.e. re-direct the forces going from the hip to the shoulder so that the forces are now directed from the shoulder to the opposing hind quarter via lightening of the forehand. Though the entire forehand must be lightened, initially more attention is required to enable the horse to lift its shoulder on its more difficult side. When the shoulder is lifted, it moves the center of mass back to the centerline of the horse. The direction of force will be reversed and now travel from the shoulder to the opposing hip. The lightening of the forehand is actually changing the biomechanics to be somewhat in line with an athletic biped.

Note (in the left drawing) the counter-flexing of the neck when the forces are driven into shoulder. In the right drawing when the head is brought into the circle and the shoulder is lifted, the forces are now from the shoulder to the hip)



This is accomplished by a correct technique of longeing at a walk and trot in a round pen that is only eleven to twelve meters (about 39 feet) in diameter. The outside wall of the pen acts as the rider's outside. The natural horse tries to balance the shear and centrifugal forces by counter-flexing its head and neck to the outside. When working correctly on the longe, you have the ability to bring the horse's head into the line of the circle. The longeing should be performed using a cavesson rather than a bridle and is definitely not well accomplished with a halter. It works best to attach the longeline to the ring on the top of the noseband.

(Note the counter flexion and weighting of the RF shoulder)

The 11 meter circle allows the handler to walk with the horse and stay positioned so that he or she remains perpendicular to the horse's head. A long whip is helpful to touch the shoulder, or the girth line, as needed, to encourage lifting of the shoulder. The whip should not be used on the hindquarters. More time would be spent on circles to the right if the horse is right forelimb

dominant. Sessions should be limited to no more than 20 minutes and should be continued until balance and strength of the wither and neck muscles is achieved. Patience will be rewarded. *Note that my previous comments about the horse not being designed to move in small circles is with regard to typical longeing or round-penning techniques as verses this form of postural correction via corrective longeing.*

The value of the this system can be illustrated by another exercise with you taking the part of the horse. Bend well forward at the waist, so that your arms can simulate the forelimbs. *Stay relaxed;* have your partner, who is on your right side, grasp under your chin so his or her hand is gently holding your left cheek. The partner then lifts and bends your head and neck toward him (the inside of the circle). See how this exercise causes you to lift your shoulder thus lightening your "forehand." It shifts your weight off the shoulder and onto your left leg. This is exactly what you need to do for the horse via your longeline. The horse should not be allowed to go "long and low" until he is able to maintain the longitudinal and vertical balance required for a supple, relaxed and upswinging back. Going "long and low" before balance and structural development is attained, literally "dumps" the horse back onto the forehand and you will see the stride immediately shorten and back tension increase. The down-swing or up-swing can be monitored using the rails of the round pen as a marker.

As one then progresses to the riding phase, it may be necessary to re-evaluate saddle fit. The horse's back shape and topline often changes so much that the saddle that had been used may no longer fit.

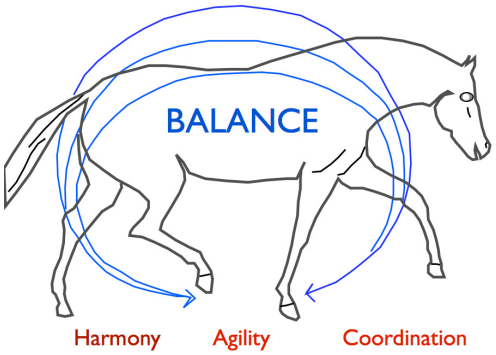
Basically, when starting the under saddle phase, the horse tends to revert back toward its "natural horse's" inherent biomechanics, so it is well to continue the longeing, but with the rider up. Once the horse is again in good carriage with an upswinging back, the rider can work to equalize the horse's tracking in both directions on the circle and strengthen the muscles of the haunches in order to achieve proper collection. Riding may be started with the right hand lifted toward the riders breast. With a give and take rein, the horse is encouraged to lift the shoulder. This would be the right rein in the case of the right forelimb dominant horse. (Remember the exercise using you as the horse and the effect of your partner bringing your head up and into the circle.)

The next key to balance is to work the (right forelimb dominant) horse on shoulder-in movements while turning to the right, and using a haunches-in movement while going to the left. Here, I would refer those riders who have not been trained in the use and production of these movements to find a good instructor who can help you understand, learn and properly use the shoulder-in and haunches-in. It should be recognized that is very difficult and often impossible to perfect the shoulder in if the horse has not been brought to an upward swinging back. This once again emphasizes the necessity of achieving this state prior to any ridden work.

The space limitations of an article such as this can only touch on the principles and not describe the details desired to fully accomplish the on the ground technique let along the details of the training under saddle. The references at the end of this article that will be very helpful to your learning. So, even though the descriptions given here are, of necessity, very brief and not detailed, the results of performing the steps will yield wonderful results.

No matter how well trained your mount is, there is value in periodically going back to the in-hand work and practicing the balancing exercises. This is particularly true if, for whatever reasons, the horse has had a lay-up period. *The natural biomechanics are deeply imbedded and will come back into play if allowed to do so.*

There are always other paths to the top of any mountain and ways to do a task, so it may be with achieving balance and creating a more ambidextrous horse. The system discussed in this article works well. Some months ago, we started a new 3 year old filly with this system and after the in-hand phase was established and the riding phase instituted, my wife commented, after the fourth riding session, that it was the first time she had ever started a young horse that it did not feel like she was driving a big truck. Enough said!



References and further reading:

"Correct Movement in Horses" (Improving Straightness and Balance), Gabriel Rachen-Schoneich and Klaus Schoneich, Kenilworth Press, ISBN: 978-1-905643-14-6 (available through www.drkerryridgway.com)

"Tug of War: Classical Versus 'Modern" Dressage (Why classical Training Works and How Incorrect "Modern" Riding Negatively Affects Horses' Health), Dr. Gerd Heuschmann, Trafalgar Square Publishing, ISBN: 978-1-57076-375-5

*** The drawings used in this article are the kind permission of Klaus and Gabriel Rachen-Schoneich. The source is their book "Correct Movement in Horses." They have been modified by Dr. Ridgway for use in the paper.**

Information on clinics and seminars can be found on www.drkerryridgway.com

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