

Spooking and the Equine Eye
e-questrians.com staff writer

You have endured endless hours of flatwork, grueling lessons and early mornings at the gym for THIS moment...the first class at the local horse show. You enter the ring confident that you have done all your homework. As you make your courtesy circle, your horse calmly passes the lunch crowd.

After jumping the first two fences and cantering the diagonal line in perfect fashion, you round the turn passing the crowd again, and your horse spooks suddenly, dislodging your left stirrup and shaking the lovely rhythm you had established. You fumble for the reins, end up circling and your horse is suddenly wide-awake. He refuses to canter any closer than twenty feet away from the corner. Frustrated, you realize he's eyeing a woman standing in the crowd, her floppy straw hat waving in the breeze. He *just* went by her TWICE...and you wonder, "Is my horse stupid?"

Strolling out of the barn to the ring for your lesson, your horse is alert and responsive. You walk through the flat ring to the jumping ring where all the local socialites are chatting. You know your horse is groomed impeccably and your designer windbreaker crinkles in the sunshine as you smile hello and start buckling your chinstrap. Suddenly your horse throws his head up, knocking off your hat as he stares wide-eyed somewhere into the hills above. You jerk his head down and he starts to prance. You jump off in disgust to pick up your hat as he wheels in terror. He's been in this ring a thousand times...what in the world does he see now??



Enjoying a Sunday trail ride in the woods, you come upon a family of scattering quail. Your horse maintains his calm demeanor and ambles by. On the way home, you pass a rabbit that takes one hop and your horse goes berserk like he's seen a ghost. Is this horse a paranoid schizophrenic?

Truth be known, the above horses are not stupid, ignorant or neurotic. They are responding to external stimuli based on the way they see, which is very different than the way humans see. Look at the world through a horse's eyes and you would react the same way a horse does.

Monocular Vision

First and foremost, a horse sees two different images, one from each eye, at the same time. Characteristic of *monocular* vision, each eye works independently and sends images to separate sides of the brain.ⁱ Picture yourself in the passenger seat of a car traveling down the road at the speed of a trot. One eye sees the left side of the road passing by and the other eye sees objects on the right side passing by. Both of these pictures are somehow in the horse's brain at the same time...visualizing this could make you car sick.



A horse's visual radar detects predators from all angles even while he is grazing. His eyes on the side of his head equip him with an outstanding peripheral range of over 350 degreesⁱⁱ, leaving him a narrow yet vulnerable blind spot directly behind him.

Limited Depth Perception

The drawback of the horse's phenomenal wide-angle view is that he has very little depth perception. In contrast, the two eyes on the front of the human head use *binocular* vision to focus on the same object at the same time, giving Man a rich depth perception unequalled in the animal world. For a horse, landscapes tend to merge into one picture plane like one of those pictures that challenge viewers to find the camouflaged objects hidden in the background. Often objects become distinct only by moving around.

That woman's floppy hat went unnoticed as part of the background when the horse cantered by the crowd the first time. Then the breeze picked up, and the hat started to move. Catching the horse's left eye, the motion caught him by surprise, and he spooks in horror. Eventually, when the horse does become acclimated to the floppy hat in the picture from his left eye, he'll canter calmly by the crowd.

When the direction is reversed however, he'll probably eye the suspicious hat again until he acclimates his right eye, where the object looks a little different. Each one of the horse's eyes needs to adjust separately. Moreover, the oversized retina of the horse can magnify objects by up to 50%, making small movements appear BIG.ⁱⁱⁱ

The horse that passed the scattering quail family absorbed it in stride. They were moving when he encountered them and he could see them. However, he never saw the camouflaged rabbit standing immobile until the rabbit hopped suddenly as the horse came upon it. Thus the horse startled.

Focusing By Moving His Head

Historically, scientists have believed that a horse's retina is ramped, not flat like ours.^{iv} In other words, he's wearing a pair of bifocals. When humans put on a pair of bifocals, we bring them down when we want to read and up when we want to see something further away. A horse can't move his glasses...so he moves his head instead.



More recently, scientists challenge the idea of a ramped retina and believe instead that an area in the central retina of the horse has a higher concentration of photoreceptors. The horse then tries to focus objects on this part of the retina. Both theories come to the same conclusion; a horse must move his head up and down to bring objects into focus to minimize a blurred effect.

Besides raising and lowering their heads to sharpen the image, horses also move their heads horizontally, letting each eye see the object individually. A narrow field directly in down the front of the horse's nose is the only area where both eyes can focus on the same image. A horse often will draw his nose up in order to focus the object on the only area where he has any depth perception.^v

So while far superior in his visual 'sensaround' range, a horse is handicapped in focusing images and in his depth perception related to determining height and distance.^{vi} For example, a horse lowers and raises his head to appraise the height, width and distance from an object. A tight martingale restricting head movement could affect a horse's attempt to focus on an approaching jump.

Remember the horse who walked out to the ring calmly, then wheeled around staring into the hills? His one eye detected movement, and then he attempted to turn his head to get better focus with both eyes, switching to binocular vision. Horses cannot use binocular and monocular vision at the same time.^{vii} When his rider restricted him from turning his head, he got anxious. A predator was lurking and he was in handcuffs.

Another point to keep in mind...simply put, horses see things that we cannot. Both his distance vision and sense of smell is superior to ours. Just because WE don't see an enemy prowling the hills doesn't mean a horse won't detect it. A horse uses his natural instincts, specifically vision, hearing and smell, to protect himself and YOU for that matter. If nature tells him there's a bobcat sitting on a hill, he's going to want to check it out, then decide whether to run away from it.

Color, Night Vision & Farsightedness

Once we understand how a horse sees, we'll understand the horse's viewpoint. Take the following examples...

Your horse spooks at a new freshly painted blue panel but trots right by the new green panel. Current color vision studies reveal that horses see the world in shades of yellow, blue and gray.^{viii} Bright red appears yellowish and dark red appears gray. Greens turn to a muddy yellow. Blue is blue and yellow is yellow. This [lack of] color distinction can affect a horse's performance in a variety of ways. A horse may notice the bright blue panel and spook at it first, then jump it beautifully. The green panel turns a muddy yellow and may blend into the light color of the footing. While he doesn't find the color startling, he may jump it lazily. Coupled with the fact that it looks blurry, he can't tell how wide it is and he doesn't see it when he's right in front of it, it's a wonder horses jump at all!

What a Human Sees



The colors a human sees *

What A Horse Sees



The colors a horse sees *



The colors a human sees *



The colors a horse sees *

*Source: *Photopigment Basis for Dichromatic Color Vision in the Horse*, Joseph Carroll, Medical College of Wisconsin, Milwaukee, WI, *Journal of Vision*, Vol 1, P 80-87

Have you ever had a horse knock down a single airy vertical at 3 feet but jump the wall at 4' like a superstar? With depth perception that's sketchy at best, coupled with a tendency toward farsightedness, horses tend to develop a horizontal astigmatism,^{ix} which means that vertical lines appear sharper and horizontal lines seem blurry.

An afternoon trail ride turns into an evening hike yet your horse seems quite comfortable at dusk. Horses see almost 50 percent better than humans in the dark, which means his vision, coupled with his sense of smell, is your compass to find your way home.

Next weekend at the horse show, however, he schools well outdoors then bolts into the indoor arena like he sees goblins at every corner. Why? Horses' eyes take longer to adjust to light than any other animal.^x Give him time to acclimate to the low levels of light and he'll see much better than we do.

How do we know?

How do we know how a horse sees without asking him? Scientists have placed sensors in individual photoreceptor cells that tell us when they "fire". From studies of nerve cell function, we know which cells can detect movement, contrast or detail. We can determine whether the eye forms images that consist of light and shadow or color by knowing which photoreceptors are sensitive to changes in light and which are sensitive to blues and yellows.^{xi}

View the world through your Horse's Eyes

Because animals see the world differently doesn't mean they have an inferior perception. There are insects out there that see more colors than we do! To alert for predators, the eye of the horse is designed for extraordinary peripheral vision and high sensitivity in dim light. His color perception is muddled and he is slow to react to changes from extreme light to dark. Restricting a horse's head movement may affect his ability to focus. A horse often won't identify an object until it starts to move.

When correcting a spooking horse, react in a calm manner based on understanding what he is seeing when he spooks. Losing your stirrup, becoming unbalanced and above all...punishing the horse, will accentuate the problem. Your horse's instinctive mind deduces that the scary object is the cause of his rider's startle. He will correlate the object with his punishment, further magnifying his refusal to go anywhere near the object which by this time has become The Enemy. And guess what, the horse's memory is second only to elephants.^{xii}

Try seeing your ride through a horse's eyes and you'll be amazed at how the world appears. Learn to understand his vision and you'll get an insight into his equine mind, anticipate his anxieties and improve his performance. In return, he'll spook less and may end up warning you of predators ahead that would have completely escaped your awareness.

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- ⁱ *When Worlds Collide* by Karen E.N. Hayes, DVM, MS. Horse and Rider Magazine, August 1996
- ⁱⁱ *In A Horse's Eye* by BH Grahn, DVM, Associate Professor of Ophthalmology, Department of Internal Medicine, Western College of Veterinary Medicine, University of Saskatchewan, May 1996
- ⁱⁱⁱ *When Worlds Collide* by Karen E.N. Hayes, DVM, MS. Horse and Rider Magazine, August 1996
- ^{iv} How Animals See: Other Visions of Our World, Sandra Sinclair, Author & Publisher, 1985
- ^v AM Harmon Moore, R Hoskins, P Keller, Department of Psychology, University of Western Australia, Nedlands, Australia, Equine Veterinary Journal, September 1999, Vol 31(5), p. 354-5
- ^{vi} Practical Horse Psychology, Melvin Bradley, Department of Animal Sciences, University of Missouri-Columbia, 1999
- ^{vii} *Equine Eyesight – What Do Horses See?* By Cheryl Sutor, Equusite.com, 1996
- ^{viii} *Photopigment Basis for Dichromatic Color Vision in the Horse*, Joseph Carroll, Medical College of Wisconsin, Milwaukee, WI, Journal of Vision, Vol 1, P 80-87
- ^{ix} How Animals See: Other Visions of Our World, Sandra Sinclair, Author & Publisher, 1985
- ^x Practical Horse Psychology, Melvin Bradley, Department of Animal Sciences, University of Missouri-Columbia, 1999
- ^{xi} How Animals See: Other Visions of Our World, Sandra Sinclair, Author & Publisher, 1985
- ^{xii} Practical Horse Psychology, Melvin Bradley, Department of Animal Sciences, University of Missouri-Columbia, 1999