Explanation of Rotational Falls and a Scientific Solution in relation to Reverse Pinning and the MIM Clip

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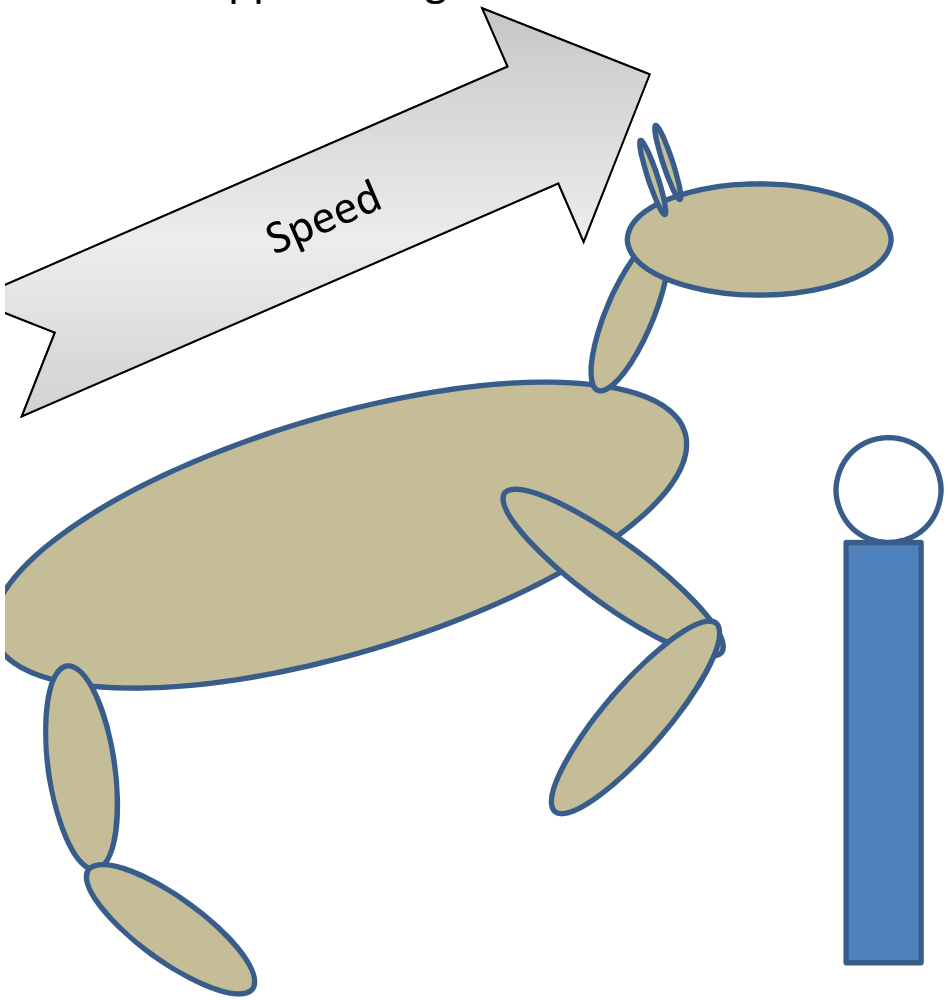
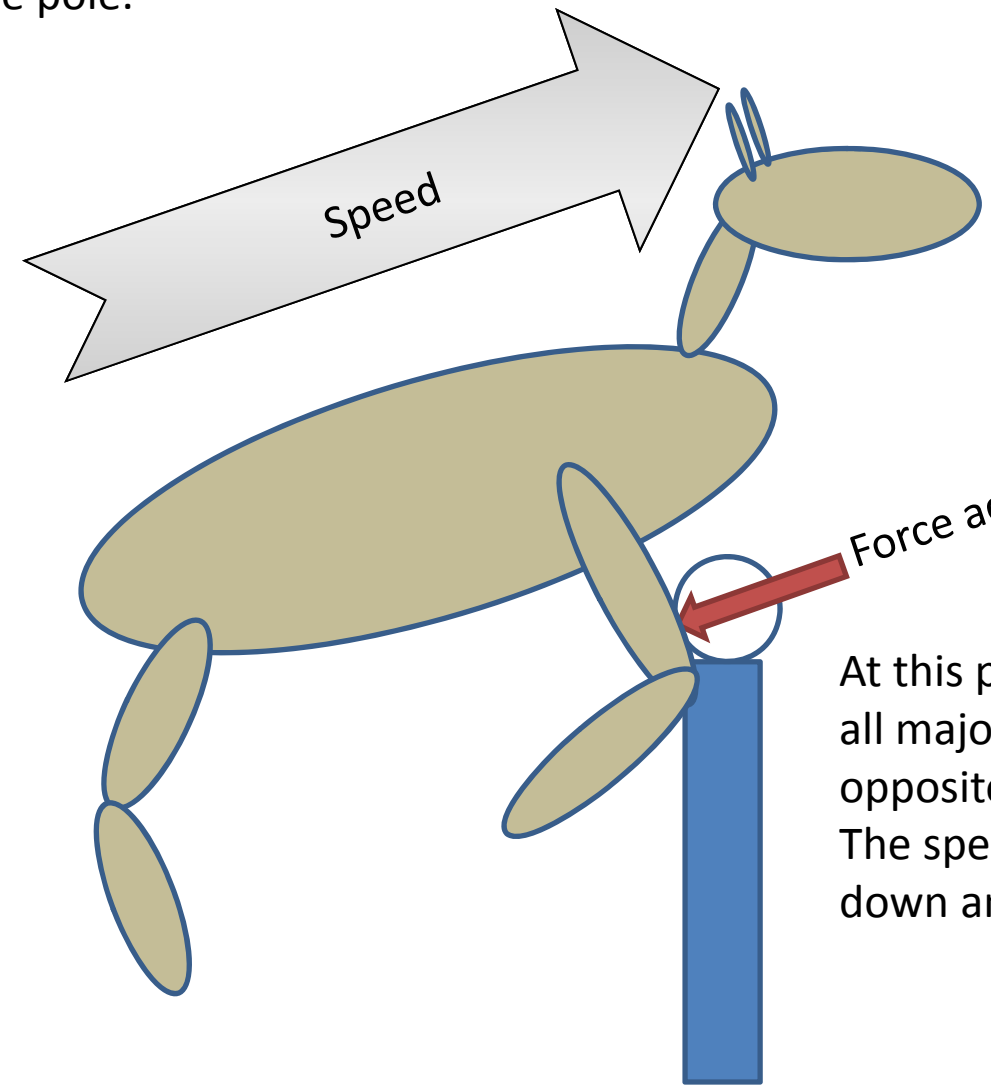
WHAT is a Rotational Fall?

The horse is travelling forwards and upwards when approaching the fence.



WHAT is a Rotational Fall?

Coming in too low the legs get trapped in front of the pole.

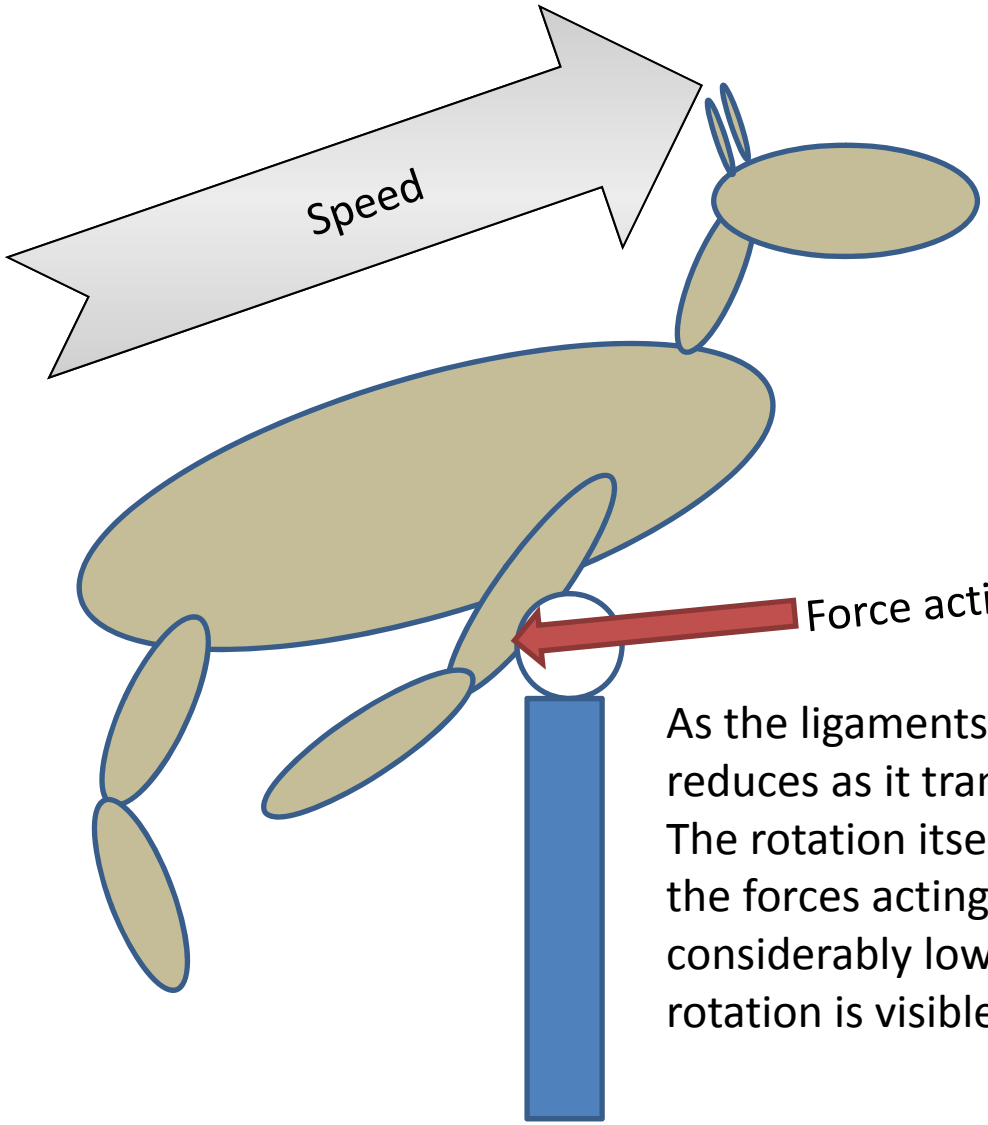


Force acting on horse (Level=Length of arrow)

At this point the horse impacts the fence and all major forces acting on the horse have the opposite direction as the speed of the horse. The speed of the impacting legs quickly slows down and stops.

WHAT is a Rotational Fall?

The horse keeps moving forward.



As the ligaments stretch the forward speed reduces as it translates into a rotational speed. The rotation itself takes time to develop and the forces acting on the horse will be considerably lower at the point when the rotation is visible.

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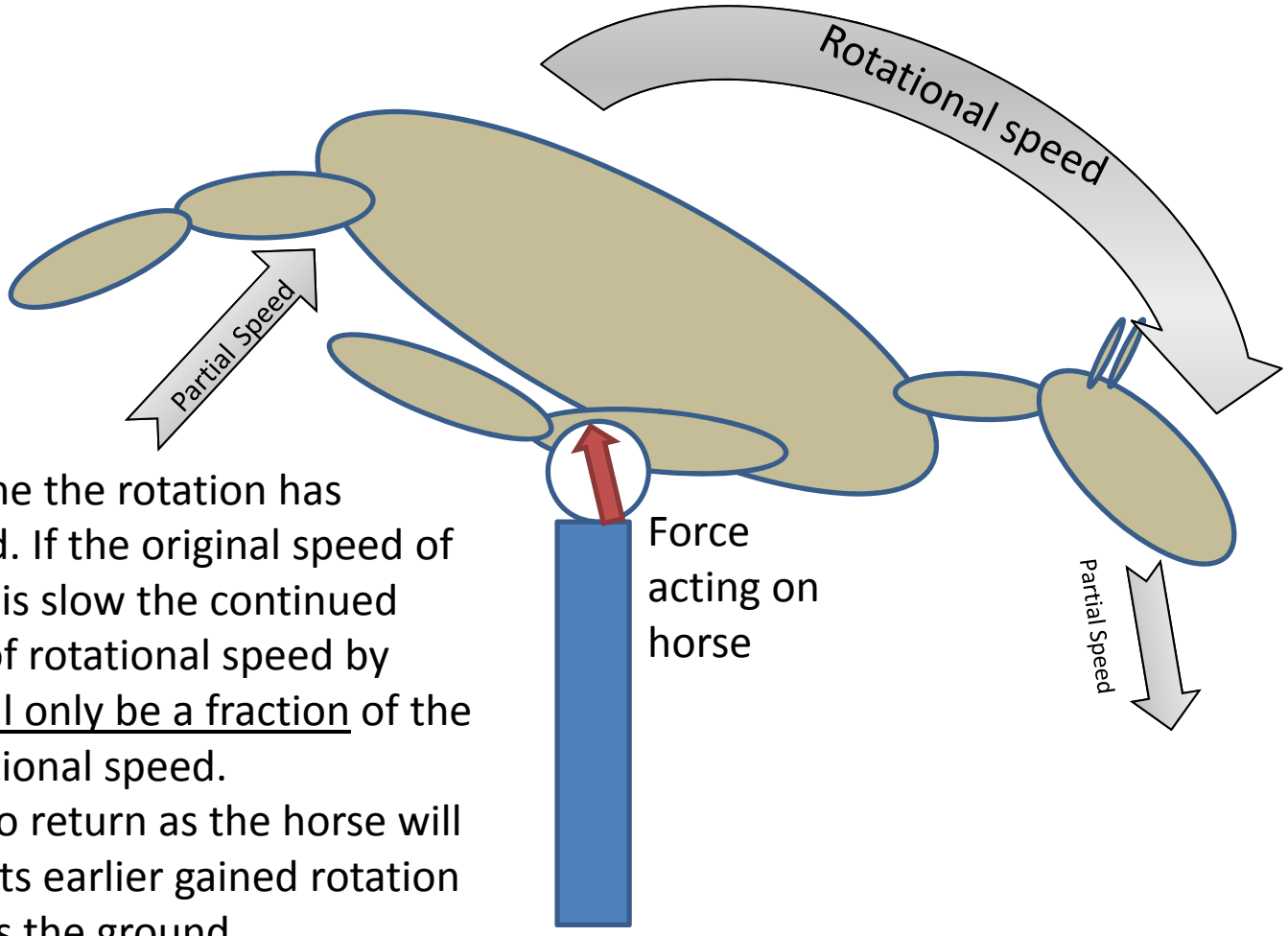

By this time the rotation has developed. If the original speed of the horse is slow the continued increase of rotational speed by gravity will only be a fraction of the total rotational speed.
There is no return as the horse will continue its earlier gained rotation until it hits the ground.

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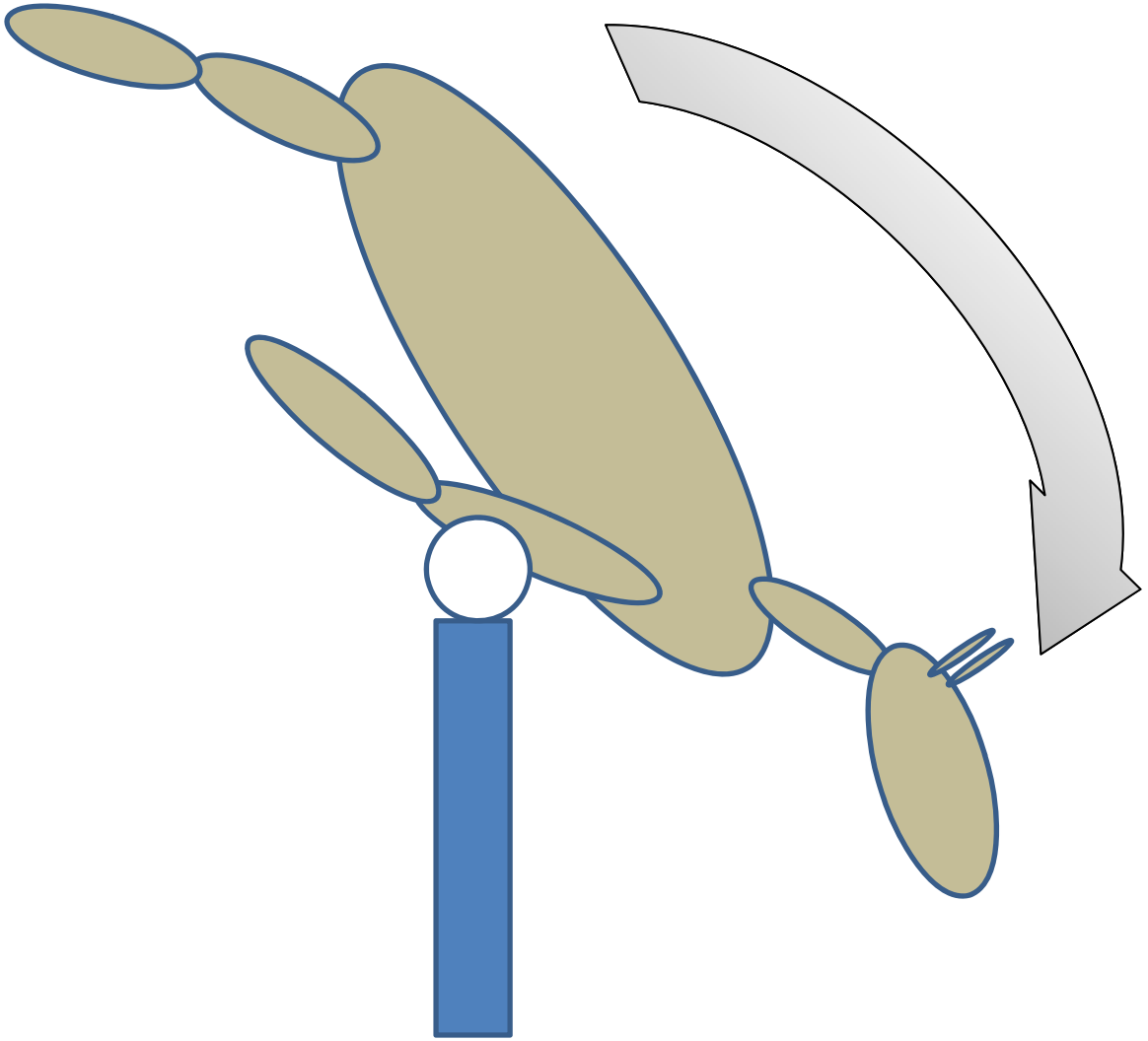

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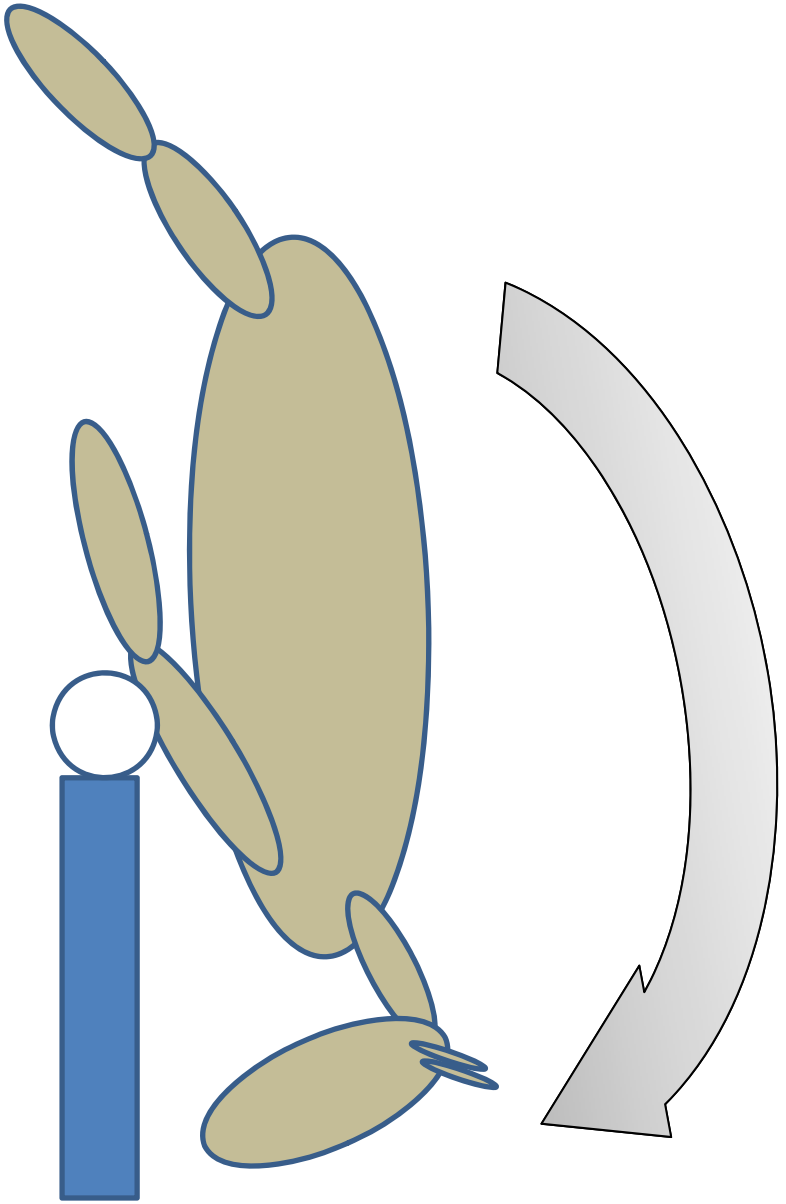

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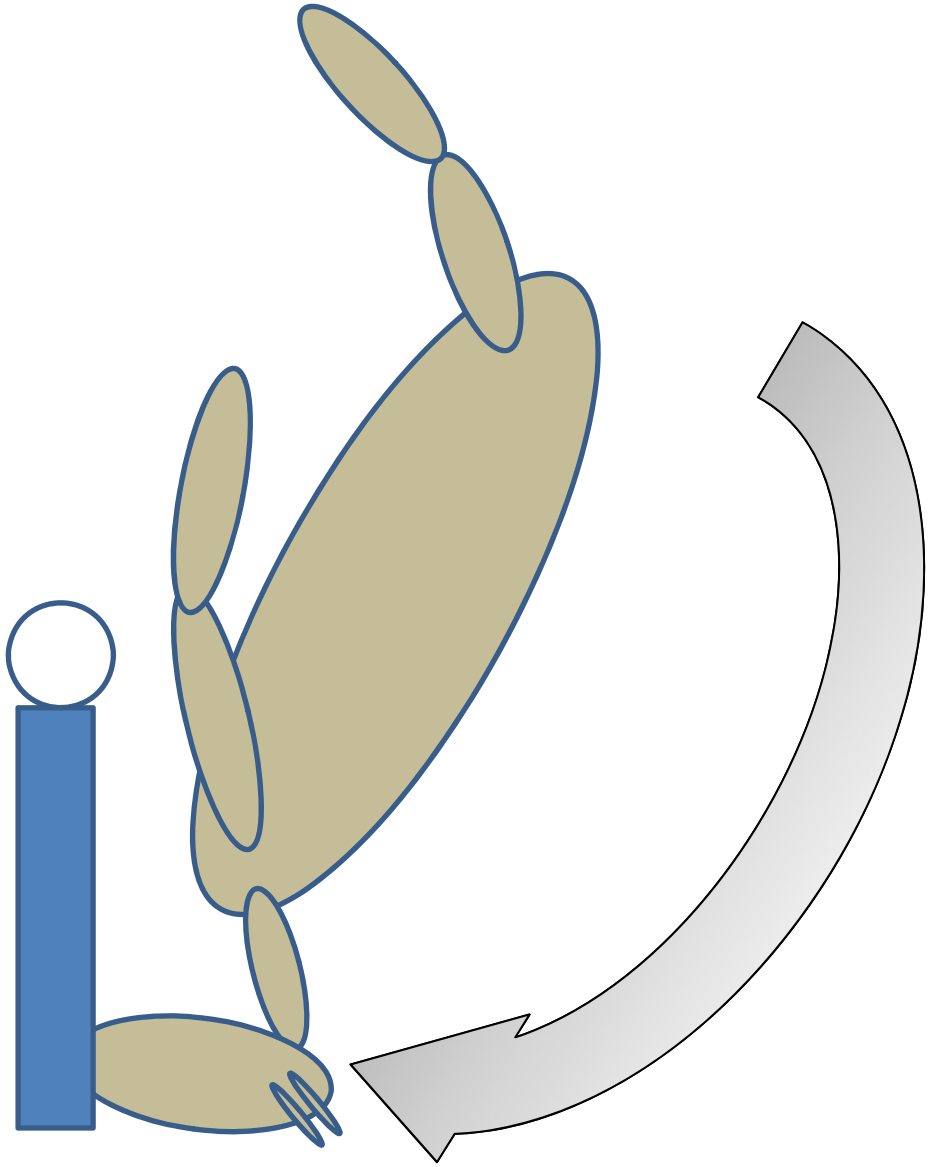

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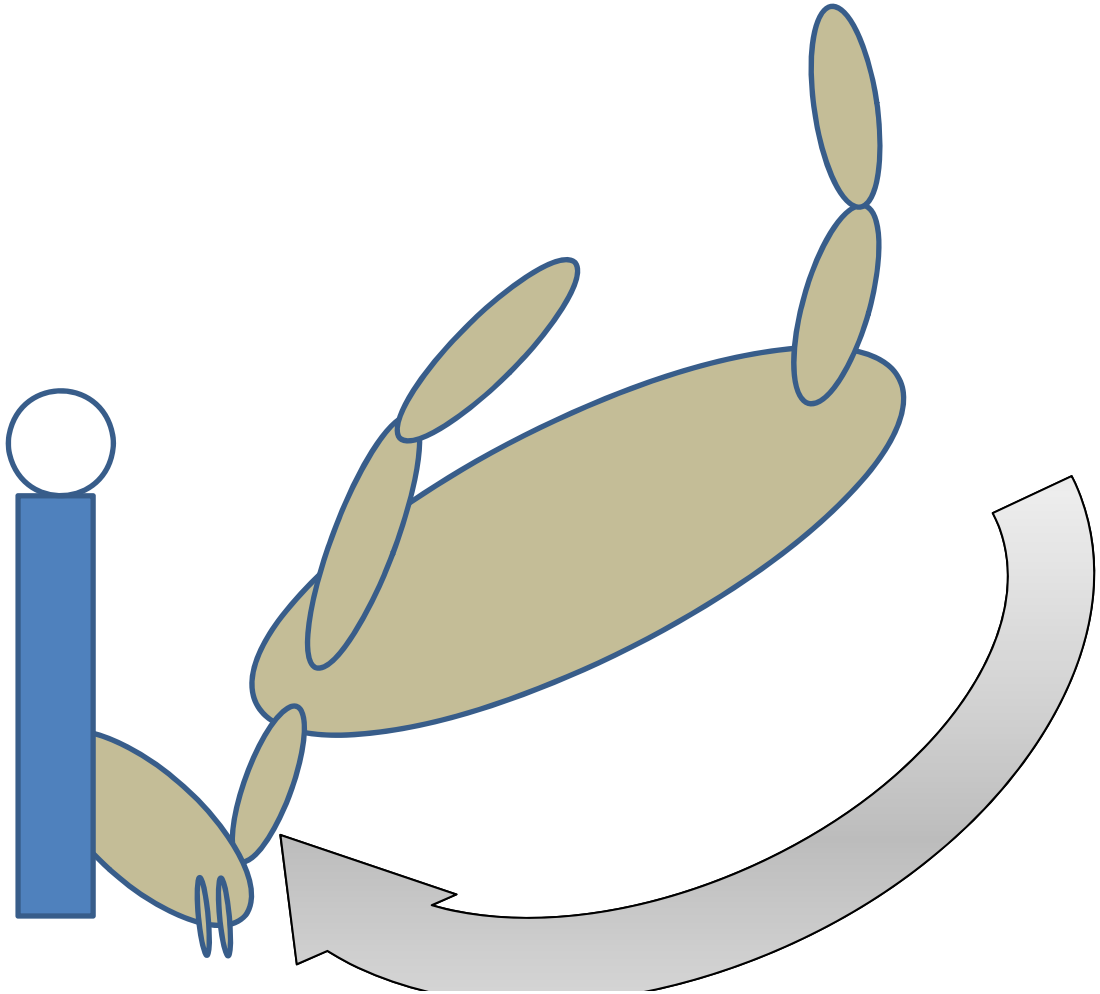

Theory behind the original BE Front Pinning in Rotational Fall

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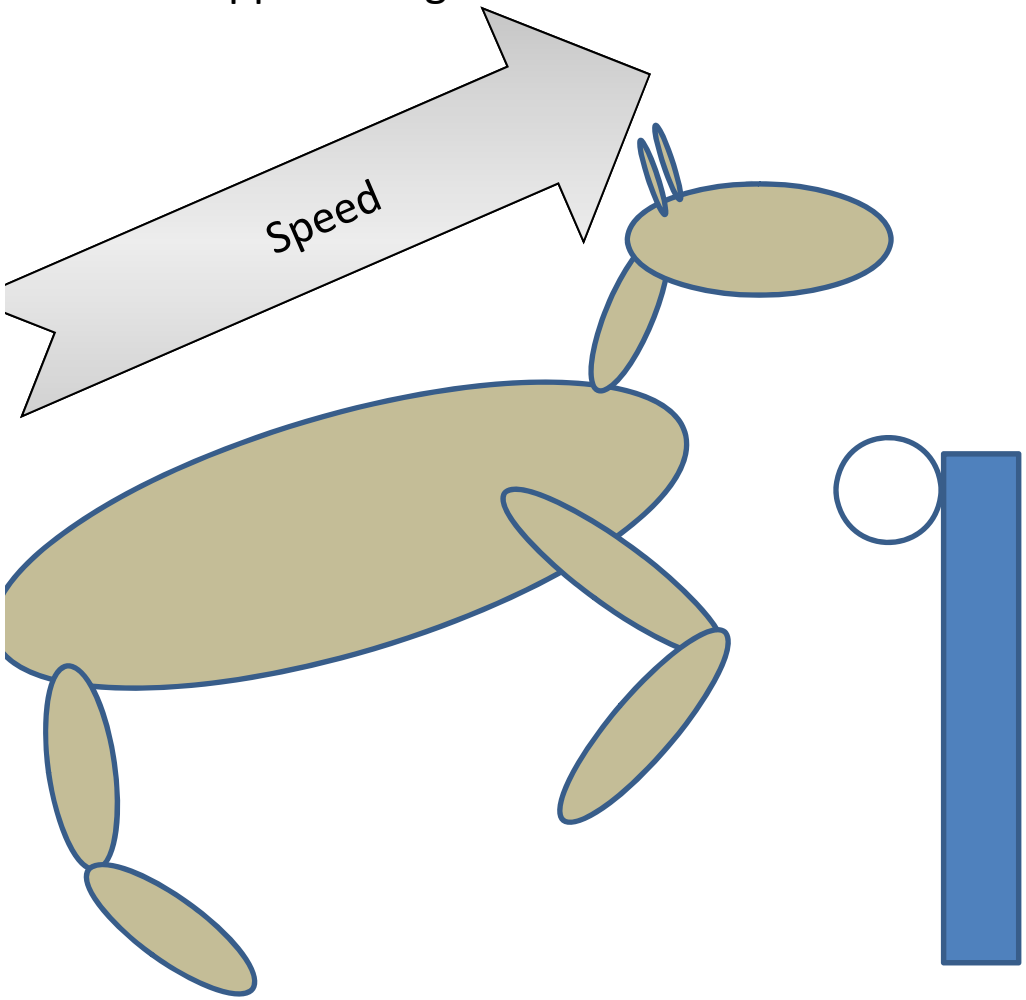
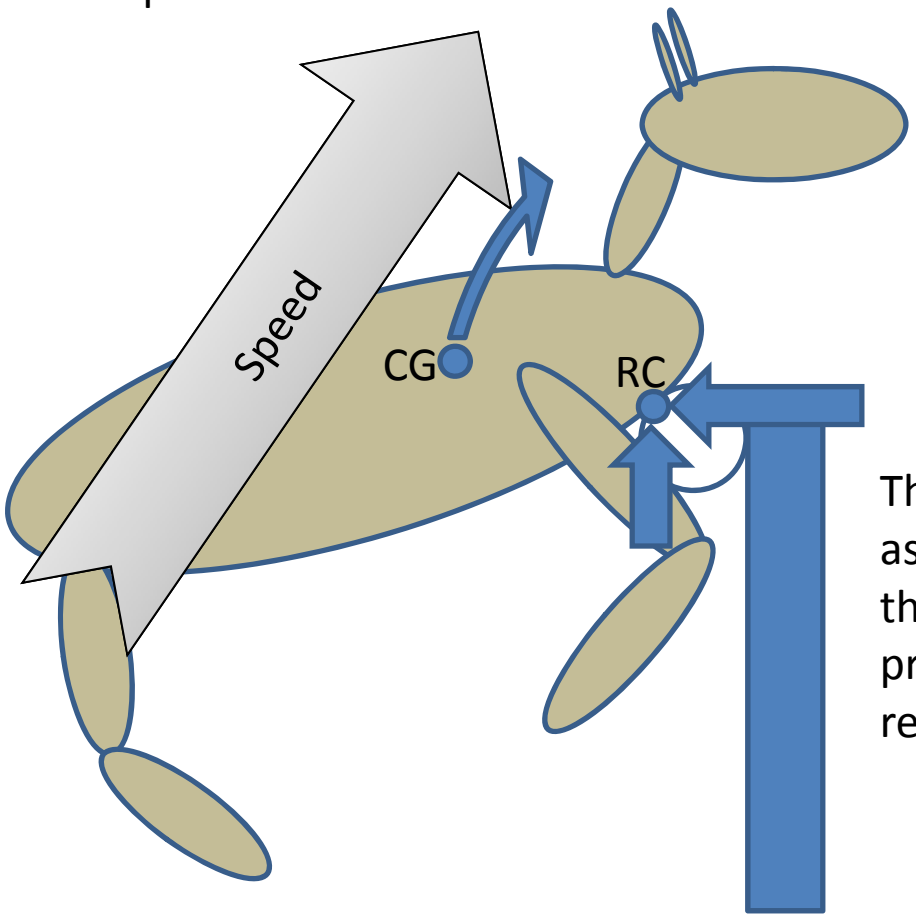
The horse is travelling forwards and upwards when approaching the fence.



Theory behind the original BE
Front Pinning in Rotational Fall

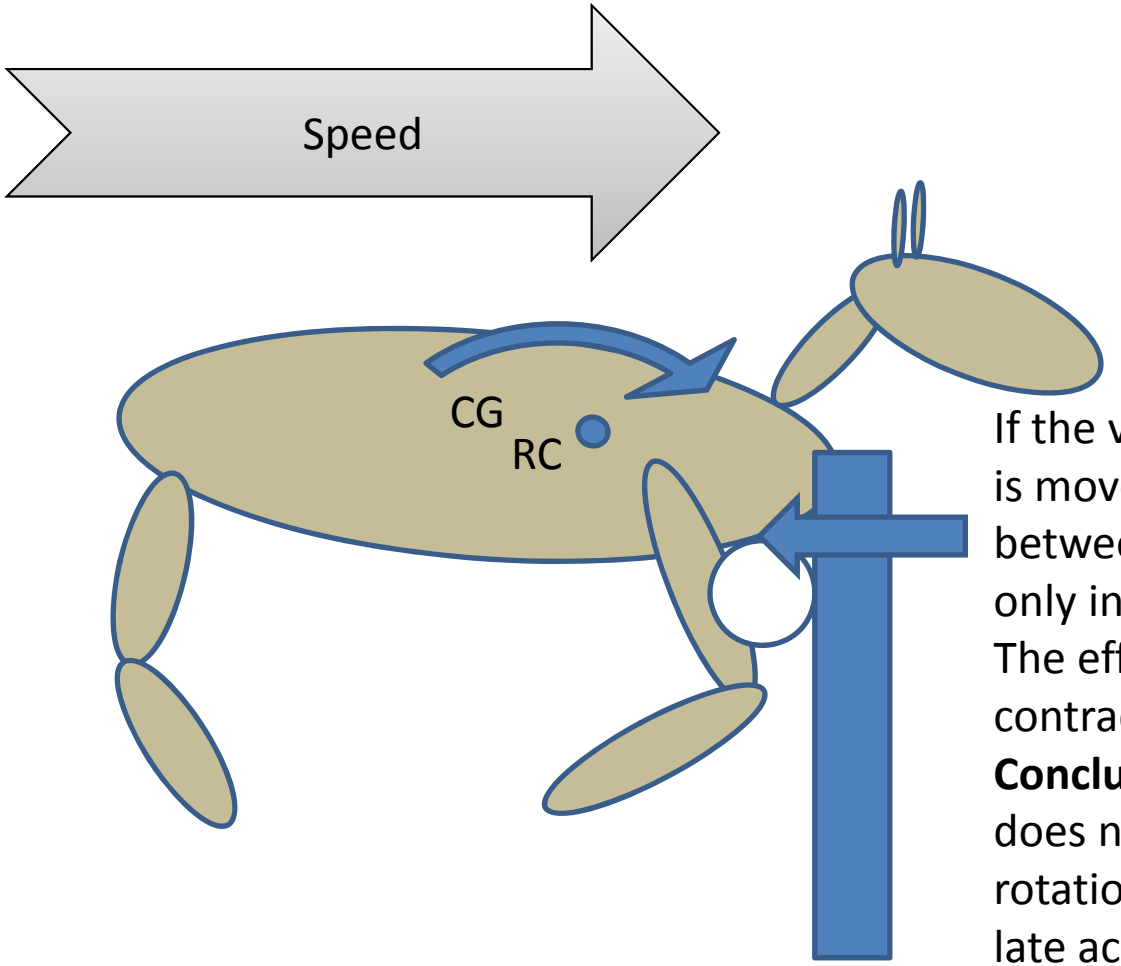
Theory: The horse hits the fence more or less like a rigid body creating a vertical force acting downwards.
Rotation takes place around rotational center (RC). Forces at contact are split into horizontal and vertical.



There is a vertical force acting on horse as it rotates around RC and needs to lift the Center of Gravity (CG) in this process. If taken away: Do we gain in reducing the rotation?

Theory behind the original BE Front Pinning in Rotational Fall

The theory was that if the vertical force is taken away rotation is limited.



If the vertical force is taken away the RC is moved to the CG and the distance between the CG and RC is zero thus only increasing the rotational speed! The effect in theory is actually contradictive!

Conclusion: Reducing the vertical force does not give the desired reduction in rotational speed. Compare to the very late achieved vertical force in the earlier explanation of a rotational fall.

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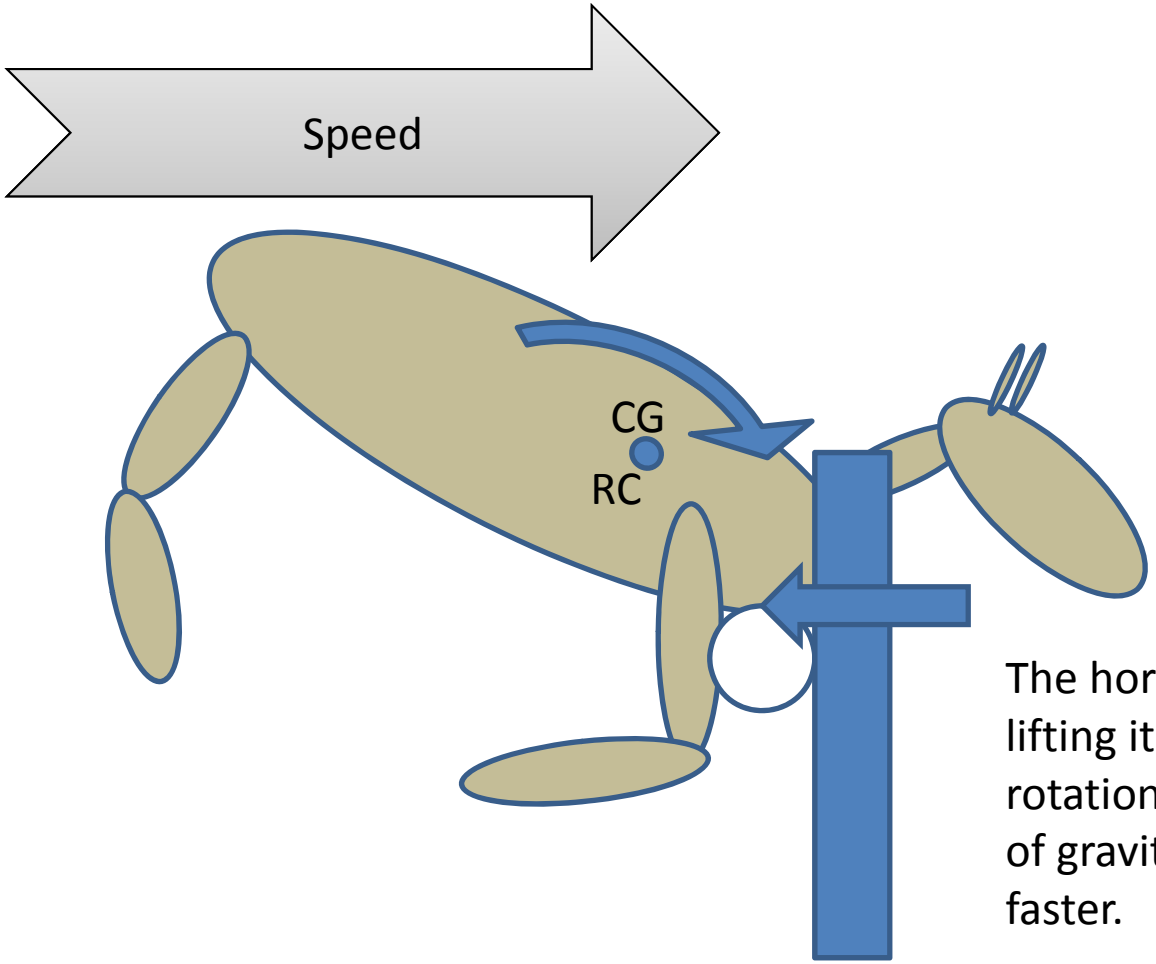
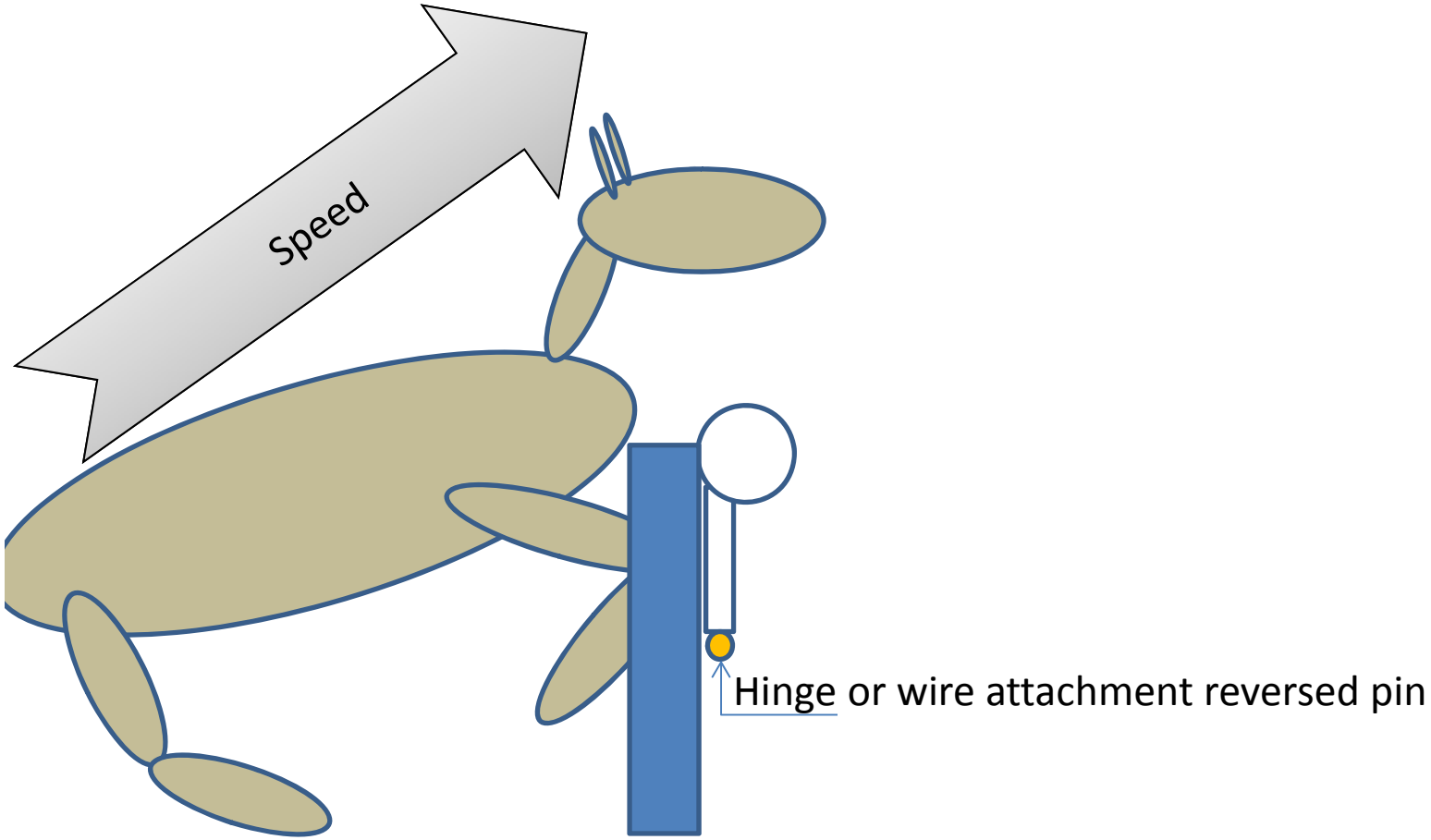


The horse continues forward without lifting its center of gravity and the rotation takes place around the center of gravity which then makes it spin faster.

HOW to REDUCE the Risk of Rotational Fall by Placing the Pole on the back of the Upright using BE Reverse Pin or MIM Newera Clip

Post and Rail use by placing the pole on the back of the upright

The horse is travelling forwards and upwards when approaching the fence.



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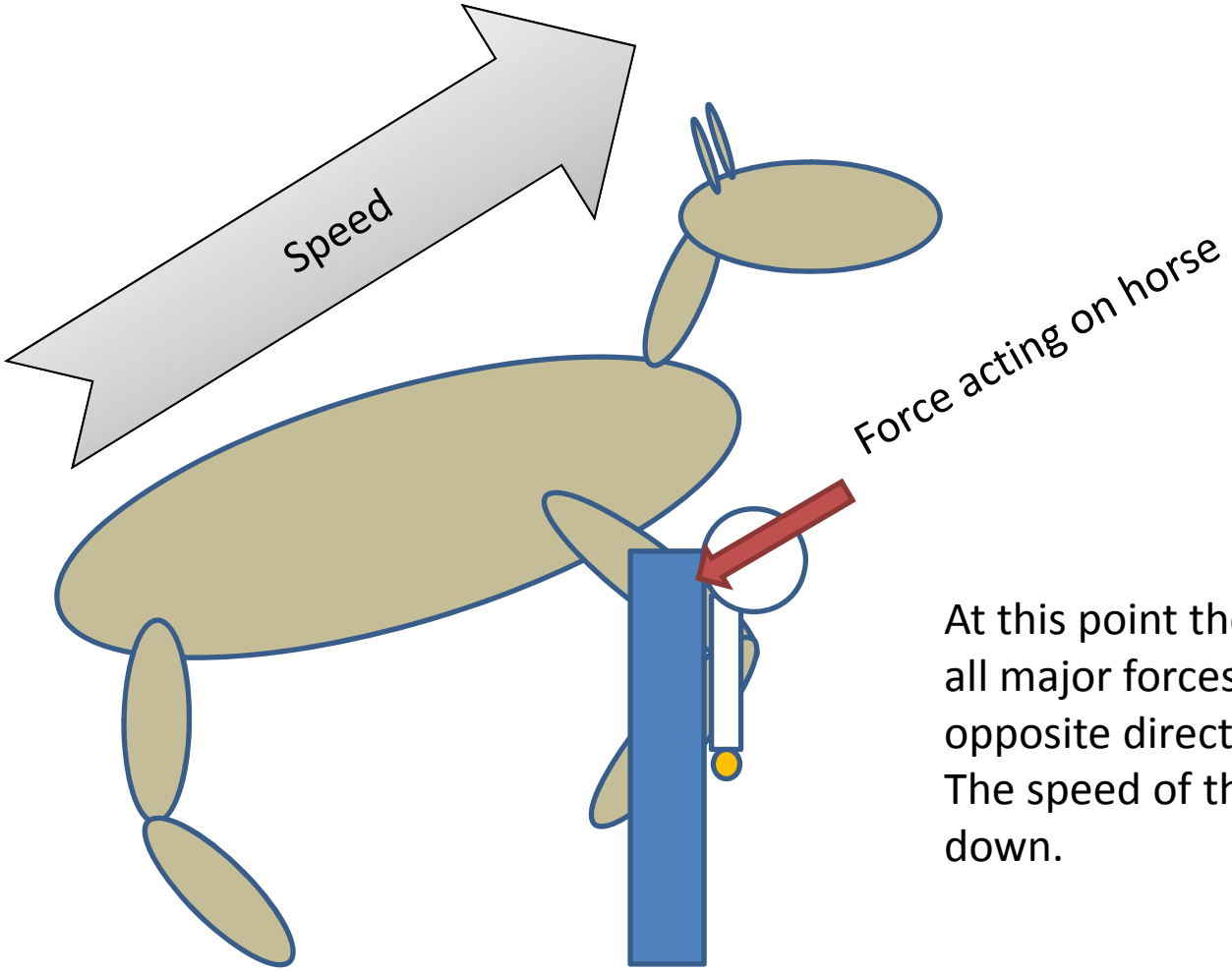
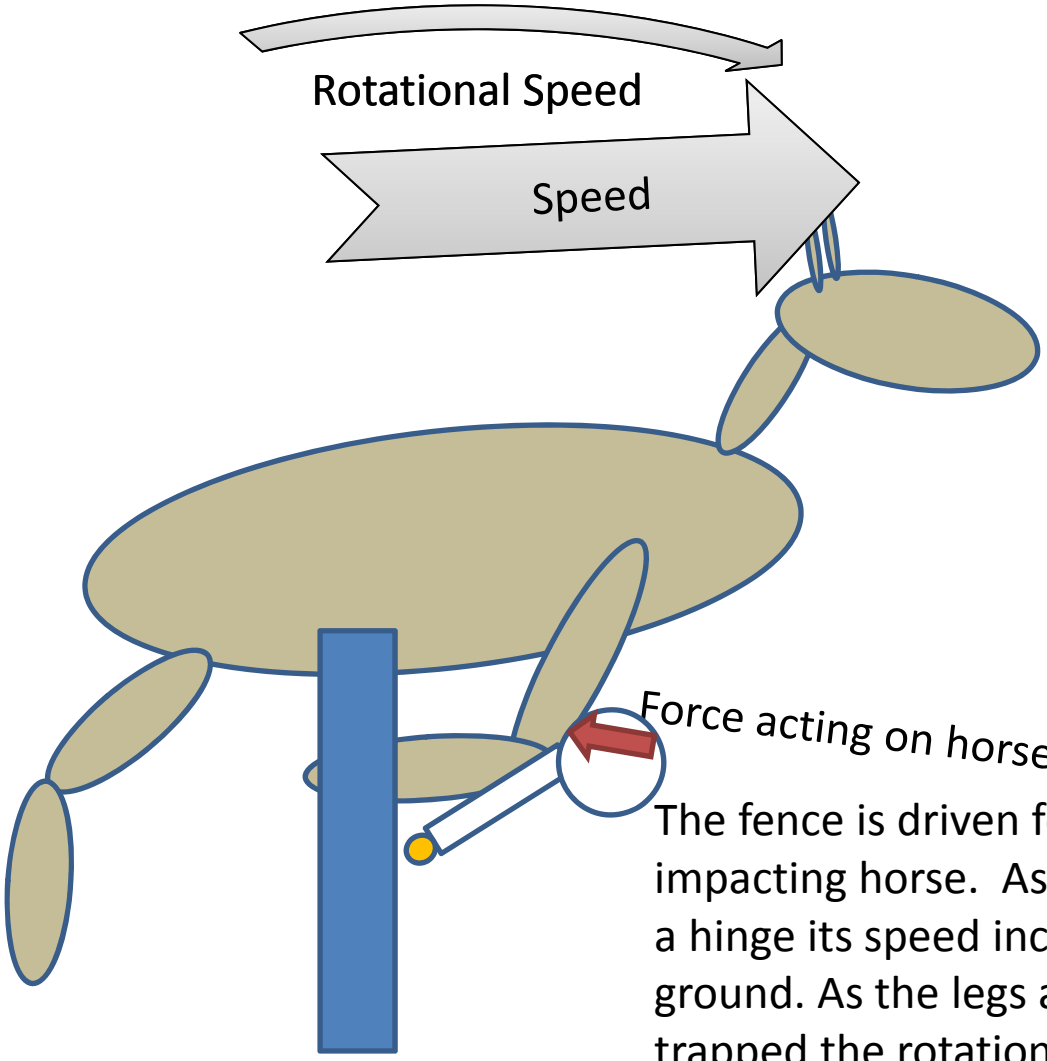


At this point the horse impacts the fence and all major forces acting on the horse have the opposite direction as the speed of the horse. The speed of the impacting legs quickly slows down.

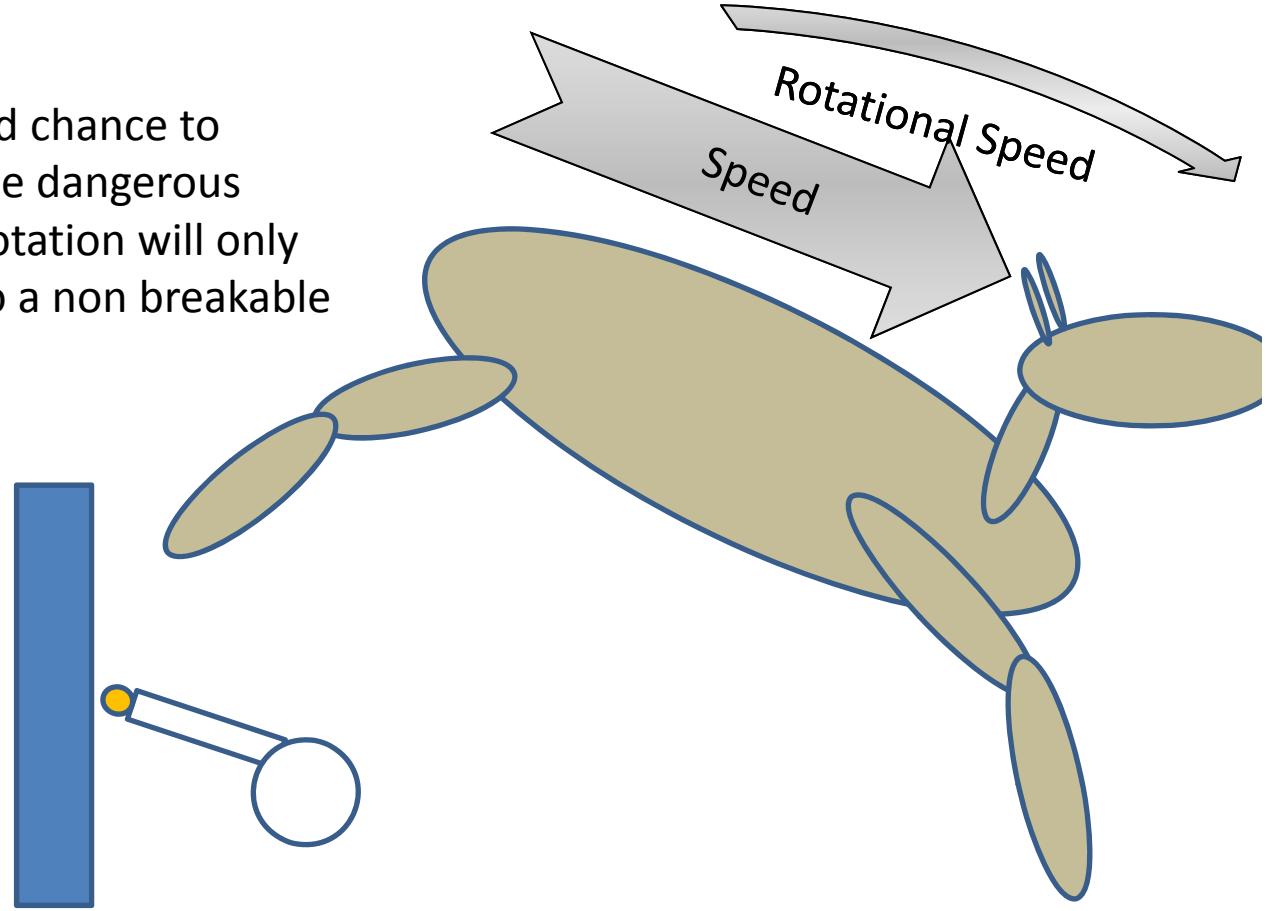
Post and Rail use by placing the pole on the back of the upright



The fence is driven forwards together with the impacting horse. As the fence rotates around a hinge its speed increases towards the ground. As the legs are never completely trapped the rotational speed is reduced compared to a non breakable fence.

Post and Rail use by placing the pole on the back of the upright

The horse will have a good chance to recover from the would-be dangerous rotational fall. The total rotation will only be a fraction compared to a non breakable fence.



Examples of Solutions

Both Devices are approved by FEI

British Eventing Reverse Pin

MIM Newera Clip