Report on:

Rider’s Risk Management Forum

Rider Safety Discussion with emphasis on Rotational Falls.

Conducted at Tattersalls 2009 3DE.

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Appendices:

1.0 Introduction

This 2009 forum was held after the riders briefing in Tattersals at their International Horse Trials 2009. In 2008 at the same venue the concept of holding such a forum was experimented with more informally and as hoped the presence of such a large presence of international riders and opinion formers delivered an ideal opportunity to gather some very practical opinions and suggestions on improving safety in Eventing. In 2008 the object of the exercise was to provide some feedstock for the Competitions Team who was responsible for general safety improvements within Eventing Ireland. In 2009 the objective of the forum was much more focussed in terms of subject matter but intended to seek input on the solution for a global problem, the rotational fall. The forum was titled Risk Management Forum, Riders Safety Discussion with emphasis on Rotational Falls.

1.1 Overview

The initiative to hold the RMF was that of the Irish Riders Representative Group and their intention was to provide a forum where the people with the most to gain from finding ways of mitigating the possibility and effect of rotational falls could address the problem with their peers. It was felt that as the group most impacted by the risk and effects of rotational falls riders should almost by definition play as major a role in finding solutions to the problem, a situation which was not perceived to be the case at the moment hence the RMF. As it was the initiative of the Riders Rep Group and the immediate concern was what riders were doing and could do about the rotational fall it was decided that in the interests of providing a practical focus the discussions would primarily be on matters which riders and the rider could address or influence. It was further agreed that although as in all active sports there are many risks in Eventing that as the rotational fall is by a considerable margin responsible for the greater proportion of fatalities that the forum would be primarily directed at the rotational fall, its prevention and the mitigation of its effects.

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1.3 Approach

It was decided that as one of the main issues the forum was intended to address was the desire to see more rider initiative, influence and responsibility in the search for solutions that the major prepared inputs to the forum would be from riders but that people from all of the interest groups within eventing would be invited to attend and contribute. Again in the interests of efficiency and using the time available to its best effect it was decided to present papers which would provoke discussion on 4 topics related to the central theme (the rotational fall) rather than opening a wide ranging discussion with little focus. As the intention of the forum was to generate input globally and because of the unique opportunity the event and the venue offered it was decided that matters would be best served by enlisting respected riders with extensive experience to deliver their thoughts on the overall problem and on one of the 4 related topics each.

The 4 topics selected for both research and discussion on the day were,

1) Potential impact of course design/building and rider interface with designer/builder in minimising risk.
2) The scope for rider responsibility, education and ethos to minimise risk.
3) The role of the horse and its training in minimising risk.
4) The role of legislation and the administrative bodies in minimising risk.

The people enlisted to present and lead discussion on the four topics were,

1) Jane O' Flynn (IRL)
2) Andrew Nicholson(NZ) and Pippa Funnell(UK)
3) Mark Todd(NZ)
4) David Lee(IRL) (In this instance it was felt that an official with extensive FEI and national level legislative and ground jury experience would be best placed to lead on this topic, an aberration from the "rider problem rider solution" theme of the forum).

In advance of the forum the riders reps group in Ireland opened several lines of research to establish what the views of other international riders were, what works were already underway, what the views of scientists and other experts outside the riding community and what if anything riders could do to contribute to a solution or solutions. The fruits of this research were used in pre forum meetings briefings and the forum itself.

1.4 Objectives

To establish what the views of the international event riding community on what could be done by riders to help prevent the occurrence and fatality of rotational falls.

To communicate the riders sense of urgency with addressing the issue of fatal rotational falls.

To provide some direction from the riding community to the sports legislative bodies on how riders perceive the problem of fatal rotational falls might be addressed.

2.0 Forum Discussions

2.1 Topic 1: Potential Impact of course design/building and rider interface with designer/builder in minimising risk.

Feedback systems.
The concept of having a formal feedback system from rider to course builder was enthusiastically supported. It was felt that even when the present system (rider reps) worked at its best it may provide feed forward but very often not post event feedback which could be invaluable in improving courses at a very practical level.
At present all the systems designed to protect riders, horses and the sport are feed forward based on theory. The riders rep walks the course before its ridden, the ground jury examine and pass it before its ridden and the course designer designs something conceptually then the designer and builder complete, measure and visualise as best they can but the course and obstacles are still unridden. These checks and balances are all based on theory, the unknown and could be described as feed forward rather than feedback which of course as per the old adage is 20/20. Riders and course builders liked the idea of formal feedback on how the courses rode and a suggestion was made that perhaps a post event course walk by riders rep, course designer and builder would be of value taking note of markings at take offs, landings, grease marks, chips out of bark etc.
The view that benefits would accrue from appointing rider reps earlier and having them active with the course designer, builder and officials well in advance of the competition. Not the day of or close to the day of the competition which is viewed as inadequate and because of the consequent time pressure can have the effect of putting the rep in conflict with the designer, builder or ground jury.
Video recording of competitors riding through various combinations on course was a suggestion which went from controversial discussion to widespread acceptance by both riders and course builders in the course of the forum. It was felt it would deliver opportunities for course builders to see some opportunities to defensively build and for riders, course builders/designers and officials to critique the performance of obstacles and competitors and perhaps provide a very good training tool for safety seminars and forums.

Course Design and Build.

The formation of a formally administered database for course designers and builders was a popular suggestion as it was felt it would provide a forum for designers to learn from each others experience and whilst it might start as a simple textual system it could evolve to include the above mentioned video clips (commented) and photographs and feedback on particular fence types and combinations. This suggestion was well supported by both course designers and riders.

Course building materials came in for some discussion and it was pointed out that the materials of construction nowadays are so much more solid and advanced than they were in the past. In the past competitions were often stopped for fence repairs whereas with modern materials and techniques this doesn't happen any longer but more riders pay the ultimate price for mistakes. Coach bolts vs. ropes if you like. Conversely, there was a well supported view that the "softer, kinder" fence design is dumbing down horse and rider performance and training, as an example many portables can be "banked" and ridden badly (too slowly, too quickly or climbed) and allow inept combinations to progress up the grades where they are likely to encounter less forgiving and nowadays very well constructed fences.

There was a widespread view that course design and building with features or frills designed to distract have no place at all in the sport and can never be safe as by their very nature they take the horses mind off the job in hand. A return to simple natural materials of construction was called for and the point was made that in a natural environment or state a horse would never contemplate jumping an alligator or a cow for example. Most certainly human forms and sculptures in general in fact were widely held to be having a not very positive effect on the sport from a safety perspective.

2.2 Topic 2: The scope for rider responsibility, education and ethos to minimise risk

Rider Responsibilities.

Concerns about rider fitness and in particular fitness for the 2 and 3* levels (statistically high risk classes) were voiced along with the need to perhaps assess peoples fitness to compete at those levels, not a revolutionary concept as some professions require a minimum level of fitness (firemen, policemen etc) in order to be allowed on the job. Indeed horse fitness seems to be more widely perceived as of critical importance and is often monitored more closely than rider fitness. Perhaps interesting to note that 2 and 3* as the high risk categories perhaps fall into the area straddled by the professional and the very accomplished but amateur rider where time available may present a challenge to some riders in terms of their fitness programmes.

Some of the more experienced riders contributing to the discussion made the point that whilst the speed of approach was one contributing factor to the phenomenon whereby we see more fatal falls eventing than in the racing world, one of the other possible contributing factors was stirrup length. A higher level of fitness is required to ride shorter cross country and it may not be coincidental there are many examples to be seen of riders riding too long.

The loss of the connection with the hunting field in modern eventing was considered to be a factor in loss of fitness to a degree but more importantly in the development of instinctive level decision making for both horse and rider, often described in the horse as “the fifth leg” but its equivalent equally important in the rider. It has now become quite common for eventing riders to compete and school very extensively in dressage as a stand alone exercise and go to some considerable trouble to do so and the point was made that the similar time deployed in honing XC skills and practice (hunting) could be even more important from a safety perspective.

A very useful point made from the floor participants in the forum took which is an excellent sound bite was “qualified doesn’t mean capable”, it serves very well in synopsising the general concern that riders must be much more aware that the responsibility for what they ride is ultimately theirs.

Change in rider mindset was seen as a highly desirable goal and potentially a great catalyst for safety improvements but it is a long slow process which nevertheless needs to be undertaken. It was suggested that areas for change include,
Recognition of risk (real time informal risk assessment).
Willingness and determination to utilise the system as it stands as an example use of the rider reps and briefings.
Recognition and acceptance that ultimately the responsibility for personal safety rests with the rider.
That the XC element of eventing it is a very high risk activity and the risks are deserving of the greatest respect without commercial influence.

Andrew Nicholson made an excellent and well supported point that in his case with experience came a greater willingness to accept a stop XC, pat the horse and go home to return another day after schooling. It was held that any ways of that simple wisdom being acquired faster than through a lifetimes experience should be examined and supported. He described the process of forcing a stopping horse on as often creating a 50:50 situation, poor odds when the stakes are often so high.

Rider Education and Ethos.

"Does having survived a rotational fall increase your chances of surviving another one"? This question asked during the research period leading up to the forum prompted some debate amongst the senior and most experienced riders; it also uncovered perhaps an important opportunity to learn more about the rotational fall. None of the panel of riders involved with this forum who had survived rotational falls had ever been asked if they had influenced their survival in any fashion or if they felt they could, in fact none of the riders involved had ever been asked if they had experienced a rotational fall. Science and common sense converged in this element of the forum research with Neil Morris an Irish Physics and Equine Science graduate providing some excellent researched presentations supporting the view that specifically symmetrical rotational falls were much more likely to be fatal than asymmetrical ones. The implication being that any influence the rider could bring to bear to change the symmetry or dynamic of the rotational fall would make it less likely to be fatal, an important point and well demonstrated by the accompanying animated presentation. Not news to Andrew Nicholson who delivered the definitive commonsense quotation of the year with "when you cant see it's(horse) ears get moving because its ass is coming", later clarified to mean "when you cant see it's ears get moving because its not going to recover",
Lucinda Green who couldn't attend the forum provided some interesting research before the event originating from the Smithsonian Institute in the USA under the heading "Risk Compensation", a phenomenon described as a need in human beings to identify or perceive a certain amount of risk in their endeavours or indeed their lives and whereby in the perceived absence of an "acceptable or expected" level of risk they will add risk or compensate as implied by the title.

This research commissioned originally by the auto industry supports the senior rider's contention that dumbing down is not making safer and in many instances simply invites a lack of respect for the dangers involved in XC riding. Many riders expressed a view that a return to the trend for simple but perhaps scary upright fences and open parallels would be welcome not least of all on the basis that those fences which were perhaps bigger and more imposing in appearance generated more respect and subliminally satisfied the human risk requirement.
Training to improve reaction time was discussed and the links between faster reaction times and diet, fitness, fatigue, age and familiarity. Some simple research on the net in preparation for the event does seem to indicate that training to increase reaction speed can be very successful and is prevalent in other sports like football and baseball. All of the senior riders emphasised the importance of reaction or response time in influencing the outcome of falls.

2.3 Topic 3: The role of the horse and its training in minimising risk.

Mark Todd was asked to prepare and deliver his views on this topic as it was felt that his experience in other sport horse disciplines and indeed in thoroughbred training would deliver a unique insight. Mark probably looked forward to a short spell at the podium as he held that the horse and its training have little impact on minimising the risk of rotational falls. Certainly he immediately discounted any thoughts that any breed or conformational type was more prone to rotational falls.
That contention did however lead to a discussion around the question, "are there horses which are more prone than others to rotational falls"? There seemed to be a consensus that yes there are horses that are more prone to rotational falls than others by virtue of their character or ability. Anecdotal evidence was offered from other senior riders which would indicate that in a number of the fatalities in recent years the rotational fall which killed the rider was by no means the first the particular horse had been involved in. Not in all cases but in a number of instances, certainly enough to demonstrate that lives could have been saved by a timely and pragmatic analysis of available information regarding those horses, ideally by the rider or from the established regulators of the sport. A suggestion was made that the suggested rider licensing system and database should really be extended to horses and their records available for statistical analysis. All the senior riders agreed that care and discretion should be exercised as anyone or any animal could have an unlucky or "no fault" fall even a rotational one, they were however also unanimous in the view that an animal or combination with more than one would be well served by some scrutiny and in the horses case a possible permanent restriction to a certain grade. The point was made that such a system would also discourage the sale under a false flag of horses that had been discovered to be dangerous at any particular level.

Mark Todd and the senior riders asked to present were in agreement that a challenge to the adequate training of young horses was presented by the fact that training or schooling venues have by commercial necessity gotten softer and softer and there is now a serious shortage of places to adequately prepare horse and rider. It was felt that this shortage of adequately challenging schooling venues or facilities was by and large a reflection of the fact that courses in general have been following a trend of getting "softer" or what is perceived as safer but which in actual fact prepare horse and rider poorly for advancement to higher levels and stronger tracks. There was a consensus at the forum that more extensive use of natural terrain and obstacles would be a very positive step towards the better preparation of combinations for the more advanced classes where fatalities currently are more common, it was suggested that more open oxers and uprights in pre and novice classes whilst it might initially increase the number of fall occurrences statistically it would likely in time contribute greatly to decreasing fatalities and ultimately would tend to decrease fall occurrences as riding standards improved.

2.4 Topic 4: The role of legislation and the administrative bodies of the sport in minimising risk.

Mr David Lee a well known international FEI TD, judge and ground jury member kindly agreed to present and chair this topic of the forum and again similar to Mark probably anticipated a short spell at the podium as he contended that the role of legislation was quite limited in addressing rotational falls and that rider responsibility played perhaps a much greater role. The topic and discussion did however contribute some extremely useful points and discussion.

David made the point which was reinforced by Jean Mitchell and the Tattersall's ground jury that before considering the introduction of new legislation to address any particular issue it was of vital importance that the present systems be used properly. This was a point very well made and one which the riders present subscribed to wholeheartedly whilst admitting that they hadn't in the past utilised fully what we now have. There was a view expressed that this approach would now change in the face of the spate of fatalities. A much greater willingness to accept that safety was often inconvenient and that the utilisation of the systems in place for rider safety can be time consuming and require some determination and commitment, was expressed by all present.

Concerns were voiced that the structure around "qualifications" and how they are derived, although its intent is clear may not serve safety as well as planned. Specifically if "clears" are the only consideration then it incentivises the 50:50 gamble described by Andrew Nicholson when forcing the stopping horse. The efficacy of a qualification system which allows people to carefully select soft options (in terms of the courses they compete on) for qualification to levels where there is no safe place for less than full competence or capability was questioned. Conversely the point was very clearly made to riders that they must be very enthusiastic supporters of the "qualified doesn't mean capable" mindset, again an issue of personal responsibility and pragmatism.

A concern was voiced with widespread support at the forum that there would be pressure applied to course designers, builders and the sports management to eliminate all falls in the sport. Many participants at the forum felt that it must be recognised that eventing is a risk sport and one where it not possible to eliminate all falls and that in fact it would not act to reduce fatalities to attempt to do so.

3.0 Observations/Recommendations

1.	The sport of eventing has fundamentally changed. Because this change has been incremental and the increments have been small and spread over time may have masked the scale of the change but cumulatively it is now sufficiently great to be described as fundamental. Change in format, change in numbers participating and changes in rules (rule changes not always having the intended effect).
2.	Research (Dr Gerald Wilde, University of Ontario) indicates that the law of unintended consequences is extraordinarily applicable when talking about safety innovations. Sometimes things intended to make us safer may not make any improvement at all to our overall safety, and in rare instances they may actually make us less safe. Goes to the question asked at the forum, is the modern emphasis on eliminating all falls and building “safer” courses actually increasing fatalities?
3.	A rider licensing system can deliver many benefits. It can record the initial capability and fitness to perform at a certain level and indeed periodic confirmations through retesting as well as providing a record of regulatory compliance. An FEI model provided to the national federations could immensely speed up this process.
4.	A universal set of guidelines for course design and building could be extremely beneficial. Such a document could encompass the use of a course designers and builders database to ensure that it stayed relevant and that the feedback and feed forward mechanisms in the sport played a real and proactive role. The FEI and the national federations could be most influential here.
5.	A horse licensing system or database could be modeled very closely on the rider system to great benefit commercially and such a system would help riders and officials to be aware of any horse issues regarding safety.
6.	It might be timely for riders to continue this initiative and drive the process of change required to decrease the risk of rotational fall and its effects by forming a well focused working group. They are by definition the biggest stakeholders in that endeavor; no other group has their lives at stake.
7.	Training of riders to recognize and respect the risk in what they do and in mitigating risk would seem to offer a lot of benefits, achieving a mindset change like this has successful parallels in the industrial world in terms of safety and quality at shop floor level. This type of change in the level of rider awareness of the risks they live with should be planned to extend to recognition that they are responsible for what they ride and how they ride them.
8.	Both the science(addendum 3) and real world experience(Andrew Nicholson, “when you can’t see it’s ears”) seems to indicate that speed of reaction can influence the outcome of rotational falls, speed of reaction can be improved and maintained by training. Rider education about the physics and nature of falls could be beneficial both in theory and through practice as part of a licensing system and fall training.

3.0 Acknowledgement

The Riders Representative Group of Eventing Ireland would like to thank Mark Todd, Pippa Funnell, Andrew Nicholson and David Lee for their time and effort on the day and their own organising group Sheila Lavery, Sue Shortt, Jane O' Flynn and Meike Beigel for their work on the day but more importantly the great effort in preparation for the forum. Tattersalls Ireland, George Mernagh and his event organisation team for the kind use of the facilities. Thanks also to the people who contributed remotely by e mail and fax and everybody who attended and went to the trouble to contribute on the day. Also thank you to Lucinda Green and Neil Morris who made great efforts to get data to the organising group despite travel and sickness.

4.0 Conclusion

The sport of eventing has fundamentally changed over a decade or so. The fact that this change has been incremental and the increments have been small and spread over time may have masked the scale of the change but cumulatively it is now sufficiently great to be described as fundamental. Change in format, change in numbers participating, change in background of participants, change in societal outlook and acceptance and innumerate rule changes. It is possible and even probable that all or any of these changes have changed the risk profile of XC and contributed toward the increase in fatalities resulting from rotational fall. Therefore it is almost certain that no single change will reverse the process, a multi faceted approach is required and during this Risk Management Forum riders expressed a willingness and urgency to consider change; fundamental change if required. An opportunity exists for the regulators and administrators of the sport to seize the moment with riders and begin what may be a long but urgent process of implementing some measures to decrease the risk of fatal rotational fall. A lot of improvement has been made and a lot of excellent scientific data has been gathered which has and will be used to riders benefit but perhaps as in riding where instinct often leap frogs or accelerates the cognitive process to our benefit when urgency is required perhaps the vast experience available from the senior rider pool can be used to accelerate this improvement process forward whilst the data and science catches and tidies up. The overriding impression left by the forum is that they (riders) have many of the answers ready.

5.0 Approvals

Prepared By: _____ Date: ____/____/____
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_____ Date: ____/____/____
Andrew Nicholson

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David Lee

Appendix 1.

Advertising Flyer

Risk Management Forum

Rider Safety Discussion with emphasis on Rotational Falls.

Agenda

- Potential impact of course design/building and rider interface with designer/builder in minimising risk.
- The scope for rider responsibility, education and ethos to minimise risk.
- The role of the horse and its training in minimising risk.
- The role of legislation and the administrative bodies in minimising risk.

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Format for this Forum:

Specialist teams (predominantly riders) will present researched papers on the agenda items. Each paper will take 3-5 minutes followed by 3-5 minutes of interaction between the specialist teams and the floor. The event will be recorded to allow accurate of analysis of input post forum and so that rider group sentiment can be shared first hand with national federations and the FEI sub committee on eventing safety.

Objective of the Forum:

Provide a forum where a large rider grouping can take a more proactive approach to defining the rider's role in solving the problem of the rotational fall.

Preparation:

Input is now being sought globally by the teams preparing their papers under the above agenda headings and anyone with a useful point or consideration is encouraged to send it to Sheila Lavery (slavery@eircom.net) who is collating data for the team leaders.

Appendix 2.

Risk Compensation Published Papers.

Risk Compensation

Written by Cynthia Wood on 20 April 2006

Let's suppose your child wants to take a martial arts class. Being a conscientious parent, you check out the local dojos and find two good places. Both are suitable and well equipped. Both practice fighting with contact – but there's one major difference. One dojo insists on a full range of protective padding – hands, feet, chest protectors, and shin guards – the whole works. The other takes a much lighter approach – hands and feet, and sometimes not even those.

To the conscientious parent, the first place is going to look much safer, right? But when you look at the injury rates of the two dojos, you notice something odd: They're about the same. The kids covered in foam padding are getting just as many bruises, scrapes, and sprains as the kids wearing almost none. What could be going on here?

What's happening is a process known as *risk compensation*. It's a tendency in humans to increase risky behavior proportionately as safeguards are introduced, and it's very common. So common, in fact, as to render predictions of how well any given piece of safety equipment will work almost useless.

In the instance of the mini-ninjas, those with pads are likely hitting and kicking harder and more wildly than those without and the adults supervising them are likely to be allowing it. Why would we do such a strange thing? Dr. Gerald Wilde of Queens University in Ontario proposes a hypothesis he calls *risk homeostasis*. In a nutshell it proposes that human beings have a target level of risk with which they are most comfortable. When a given activity exceeds their comfort level, people will modify their behavior to reduce their risk until they are comfortable with their level of danger. So far, that's not exactly a controversial observation. But risk homeostasis proposes another half to that continuum – according to Dr. Wilde, if a given person's level of risk drops too far below their comfort level, they will again modify their behavior. This time though, they will increase their level of risk until they are once again in their target zone.

It seems an odd proposition, but Dr. Wilde and his colleagues have assembled an impressive array of data to support it. For instance, a study of Munich taxicab drivers conducted while the taxicab fleet was being changed over to ABS braking systems. The drivers were tracked by observers unaware of which kind of brakes each cab had. Against the expectations of safety experts who recommend ABS brakes as a safety advance, the drivers with ABS brakes actually had more accidents per vehicle mile than those without. The drivers braked more sharply, made tighter turns, drove at higher speeds, and made a number of other adjustments to their driving, all of which more than compensated for their supposedly safer cabs.

Fortunately for us, risk homeostasis does not seem to apply in all cases. Safety innovations that are invisible tend not to provoke changes in behavior – for example changing windshields to safety glass does not alter most peoples' driving behavior. The difference in the windshield is effectively invisible to the driver, and so doesn't affect the driving. The taxicab drivers, by contrast, were intimately familiar with their cabs, and the difference in braking was apparent to them. Risk compensation can also be affected by motivation. A taxicab driver has every reason to try to get from A to B faster, but someone out for a Sunday drive to see the scenery would be less likely to go quickly in response to better braking.

Unfortunately for those whose job it is to make us all safer, risk homeostasis and risk compensation are not easy to study. It is difficult to predict how people will alter their behavior in response to a given piece of safety equipment, and thereby equally difficult to figure out what to be looking at in a study. Seatbelts, for instance, have an modestly positive effect on driver and passenger safety (though somewhat less than models predicted). It's not until you look at pedestrian safety that you really begin to see where risk compensation may be having its way.

An additional complication for the already beleaguered safety engineers is that risk homeostasis is dependent not upon actual danger, but rather the perception of risk. Much of the gender and age differences in risk-taking behavior appear to stem less from differing desires for risk, and more from the individual's different evaluation of risk. Young people, and particularly young men, tend to evaluate their level of risk as much lower than older people would, even in identical situations. This implies that promoting safer behavior depends more upon altering the perceptions of the target population, rather than improving the safety of the environment– a much trickier proposition.

What it all boils down to is that the law of unintended consequences is extraordinarily applicable when talking about safety innovations. Sometimes things intended to make us safer may not make any improvement at all to our overall safety, and in rare instances they may actually make us less safe. The human tendency to take risks may trump all the efforts of the safety engineers. In the end, no one can save us from ourselves.

Buckle Up Your Seatbelt and Behave

2.5.1 Do we take more risks when we feel safe? Fifty years after we began using the three-point seatbelt, there's a new answer

- By William Ecenbarger
- *Smithsonian* magazine, April 2009

In the middle of the last century, Volvo began seeking improvements to seat belts to protect drivers and passengers in its vehicles. When the Swedish automaker tried a single strap over the belly, the result was abdominal injuries in high-speed crashes. The engineers also experimented with a diagonal chest restraint. It decapitated crash-test dummies.

Volvo then turned to a 38-year-old mechanical engineer named Nils Bohlen, who had developed pilot ejector seats for the Saab aircraft company. Bohlen knew it would not be easy to transfer aerospace technology to the automobile. "The pilots I worked with in the aerospace industry were willing to put on almost anything to keep them safe in case of a crash," he told an interviewer shortly before he died, in 2002, "but regular people in cars don't want to be uncomfortable even for a minute."

After a year's research and experimentation, Bohlen had a breakthrough: one strap across the chest, another across the hips, each anchored at the same point. It was so simple that a driver or passenger could buckle up with one hand. Volvo introduced the result—possibly the most effective safety device ever invented—50 years ago; other automakers followed suit. No one can tally exactly how many lives Bohlen’s three-point seat belt has spared, but the consensus among safety experts is at least a million. Millions more have been spared life-altering injuries.

But before we break out the champagne substitute to honor the three-point seat belt's demy-centennial, we might also consider the possibility that some drivers have caused accidents precisely because they were wearing seat belts.

This counterintuitive idea was introduced in academic circles several years ago and is broadly accepted today. The concept is that humans have an inborn tolerance for risk—meaning that as safety features are added to vehicles and roads, drivers feel less vulnerable and tend to take more chances. The feeling of greater security tempts us to be more reckless. Behavioral scientists call it "risk compensation."

The principle was observed long before it was named. Soon after the first gasoline-powered horseless carriages appeared on English roadways, the secretary of the national Motor Union of Great Britain and Ireland suggested that all those who owned property along the kingdom's roadways trim their hedges to make it easier for drivers to see. In response, a retired army colonel named Willoughby Verner fired off a letter to the editor of the *Times* of London, which printed it on July 13, 1908.

"Before any of your readers may be induced to cut their hedges as suggested by the secretary of the Motor Union they may like to know my experience of having done so," Verner wrote. "Four years ago I cut down the hedges and shrubs to a height of 4ft for 30 yards back from the dangerous crossing in this hamlet. The results were twofold: the following summer my garden was smothered with dust caused by fast-driven cars and the average pace of the passing cars was considerably increased. This was bad enough, but when the culprits secured by the police pleaded that ‘it was perfectly safe to go fast' because ‘they could see well at the corner,' I realised that I had made a mistake." He added that he had since let his hedges and shrubs grow back.

Despite the colonel's prescience, risk compensation went largely unstudied until 1975, when Sam Peltzman, a University of Chicago economist, published an analysis of federal auto-safety standards imposed in the late 1960s. Peltzman concluded that while the standards had saved the lives of some vehicle occupants, they had also led to the deaths of pedestrians, cyclists and other non-occupants. John Adams of University College London studied the impact of seat belts and reached a similar conclusion, which he published in 1981: there was no overall decrease in highway fatalities.

There has been a lively debate over risk compensation ever since, but today the issue is not whether it exists, but the degree to which it does. The phenomenon has been observed well beyond the highway—in the workplace, on the playing field, at home, in the air. Researchers have found that improved parachute rip cords did not reduce the number of sky-diving accidents; overconfident sky divers hit the silk too late. The number of flooding deaths in the United States has hardly changed in 100 years despite the construction of stronger levees in flood plains; people moved onto the flood plains, in part because of subsidized flood insurance and federal disaster relief. Studies suggest that workers who wear back-support belts try to lift heavier loads and that children who wear protective sports equipment engage in rougher play. Forest rangers say wilderness hikers take greater risks if they know that a trained rescue squad is on call. Public health officials cite evidence that enhanced HIV treatment can lead to riskier sexual behavior.

All of capitalism runs on risk, of course, and it may be in this arena that risk compensation has manifested itself most calamitously of late. William D. Cohan, author of *House of Cards*, a book about the fall of Bear Stearns, speaks for many when he observes that "Wall Street bankers took the risks they did because they got paid millions to do so and because they knew there would be few negative consequences for them personally if things failed to work out. In other words, the benefit of their risk-taking was all theirs and the consequences of their risk-taking would fall on the bank's shareholders." (Meanwhile investors, as James Surowiecki noted in a recent *New Yorker* column, tend to underestimate their chances of losing their shirts.) Late last year, 200 economists—including Sam Peltzman, who is now professor emeritus at Chicago—petitioned Congress not to pass its $700 billion plan to rescue the nation's overextended banking system in order to preserve some balance between risk, reward and responsibility. Around the same time, columnist George Will pushed the leaders of the Big Three automakers into the same risk pool.

"Suppose that in 1979 the government had not engineered the first bailout of Chrysler," Will wrote. "Might there have been a more sober approach to risk throughout corporate America?"

Now researchers are positing a risk compensation corollary: humans don't merely tolerate risk, they seek it; each of us has an innate tolerance level of risk, and in any given situation we will act to reduce—or increase—the perceived risk, depending on that level. The author and principal proponent of this idea is Gerald J.S. Wilde, professor emeritus of psychology at Queen's University in Kingston, Ontario. In naming his theory "risk homeostasis," Wilde borrowed the word used for the way we humans, without knowing it, regulate our body temperature and other functions. "People alter their behavior in response to the implementation of health and safety measures," Wilde argued in his 1994 book, *Target Risk*. "But the riskiness of the way they behave will not change, unless those measures are capable of motivating people to alter the amount of risk they are willing to incur." Or, to make people behave more safely, you have to reset their risk thermostats.

That, he says, can be done by rewarding safe behavior. He notes that when California promised free driver's-license renewals for crash-free drivers, accidents went down. When Norway offered insurance refunds to crash-free younger drivers, they had fewer accidents. So did German truck drivers after their employers offered them bonuses for accident-free driving. Studies indicate that people are more likely to stop smoking if doing so will result in lower health and life insurance premiums.

Wilde's idea remains hotly disputed, not least by members of the auto-safety establishment. "Wilde would have us believe that if you acquire a brand-new car with air bags, you will decide to drive your new car with more reckless abandon than your old one," says Anne McCarty, a senior vice president for the Insurance Institute for Highway Safety, a nonprofit organization funded by auto insurers. "You will be unconcerned that your more reckless driving behavior will increase the chances of crashing and damaging your new car because returning to your previous level of injury risk is what you really crave! Only abstract theoreticians could believe people actually behave this way."

Still, even the institute acknowledges that drivers do compensate for risk to some degree, particularly when a safety feature is immediately obvious to the driver, as with anti-lock brakes. But seat belts? No way, says McCarty.

"We've done a number of studies and did not find any evidence" that drivers change their behavior while wearing them.

Questions over risk compensation will remain unresolved because behavioral change is multidimensional and difficult to measure. But it is clear that to risk is human. One reason Homo sapiens rules the earth is that we are one of history's most daring animals.

So how, then, should we mark the 50th anniversary of the seat belt?

By buckling up, of course. And by keeping in mind some advice offered by Tom Vanderbilt in Traffic: *Why We Drive the Way We Do (and What It Says About Us)*: "When a situation feels dangerous to you, it's probably more safe than you know; when a situation feels safe, that is precisely when you should feel on guard." Those are words even the parachutists, wilderness hikers and investors among us can live by.

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Appendix 3.

Symmetrical vs. Asymmetrical Falls.

Jump/Fall Mechanics

Content

- Photo sequence of a fall
- Basic (Newtonian Motion) Mechanics
- Application of motion mechanics to fall
- Key components

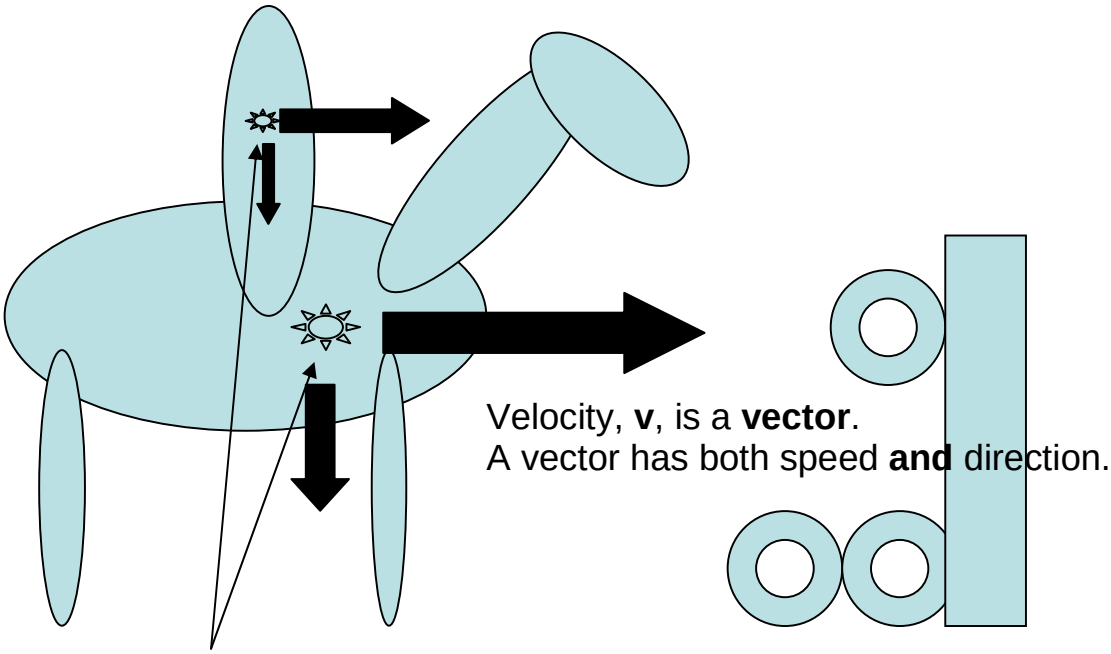
First look at a fall photo sequence


9 mins


ns
mins

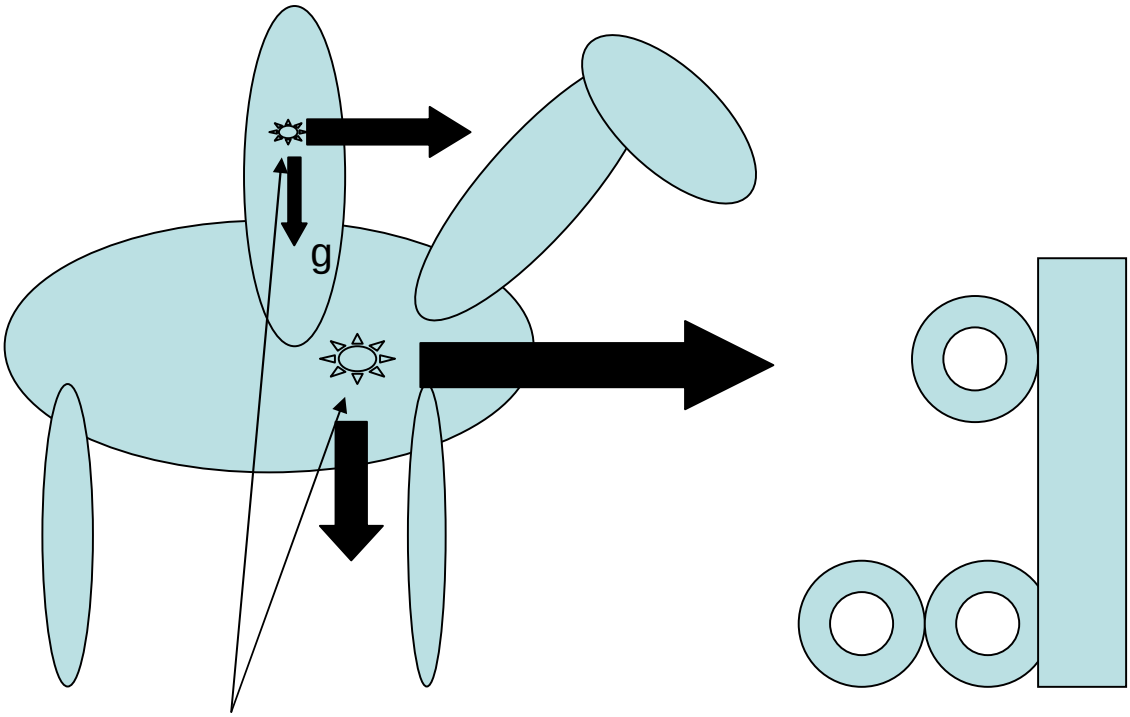
Horse and rider were fine

Jumping Mechanics



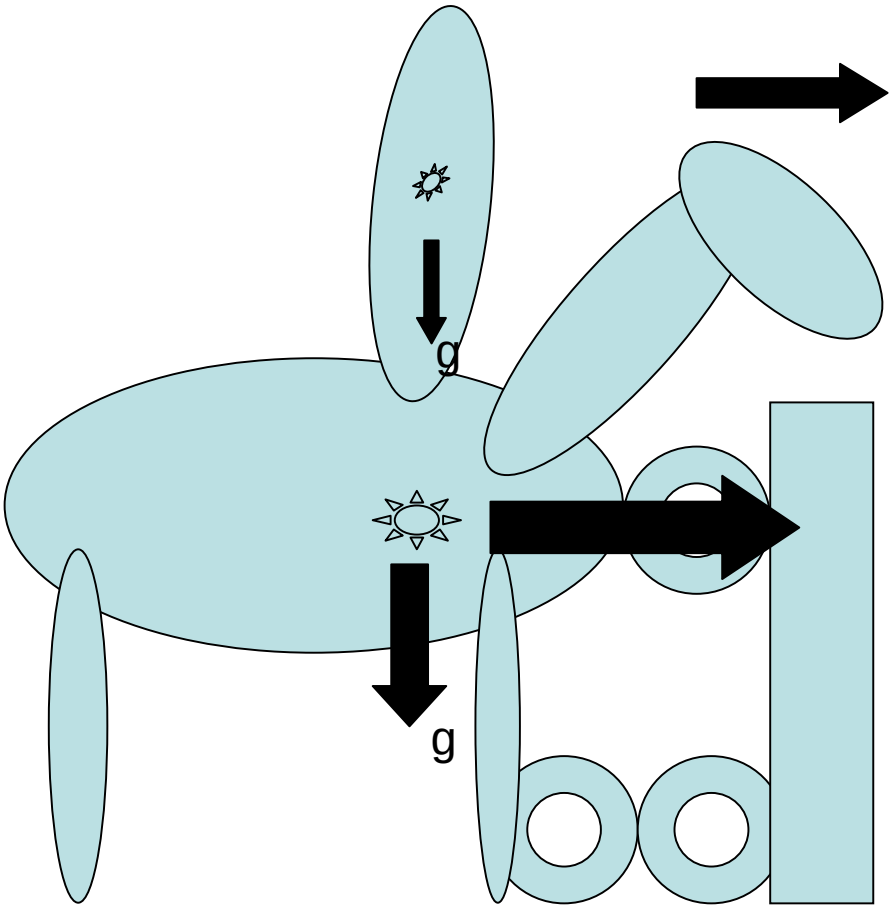
The centre of gravity is the average location of the weight (mass effected by gravity, g) of an object.
We can completely describe the motion of any object through space in terms of the translation of the centre of gravity of the object from one place to another.
Successful negotiation of a fence depends on the application of a vertical force sufficient to overcome the effect of gravity (g) on the combined mass of horse and rider at a time (t) that corresponds to the arrival of the horse and rider combination at the optimum take-off point for the fence.

Remember just this……



- Velocity, **v**, is a **vector**.
  - A vector has both speed **and** direction
  - Gravity, g, is a force acting on both horse & rider

Jumping Mechanics

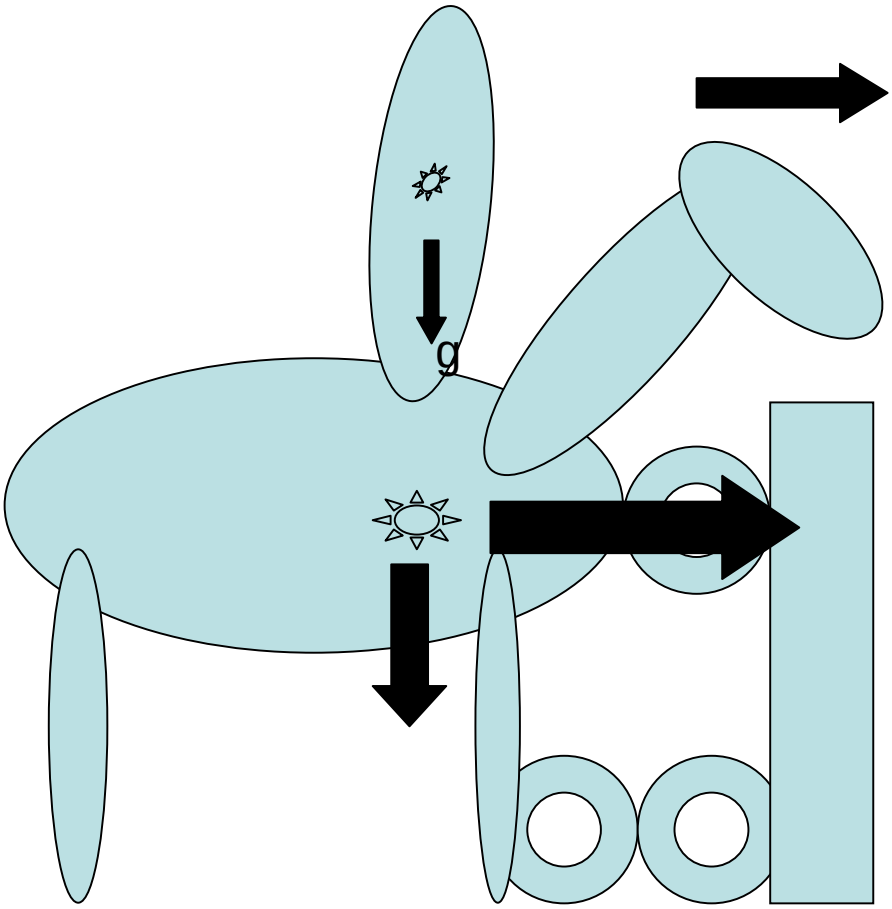


What happens in the event of no vertical force being applied?
MHz transferred to the fixed fence
Rider may be ejected due to Newton's First Rule.

Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it

No change in vector associated with horse Cg, results in horse Cg being stopped by fence.
Rider Cg not subject to this resistive force continues to move due to momentum and Newton's First Rule.

Remember just this……



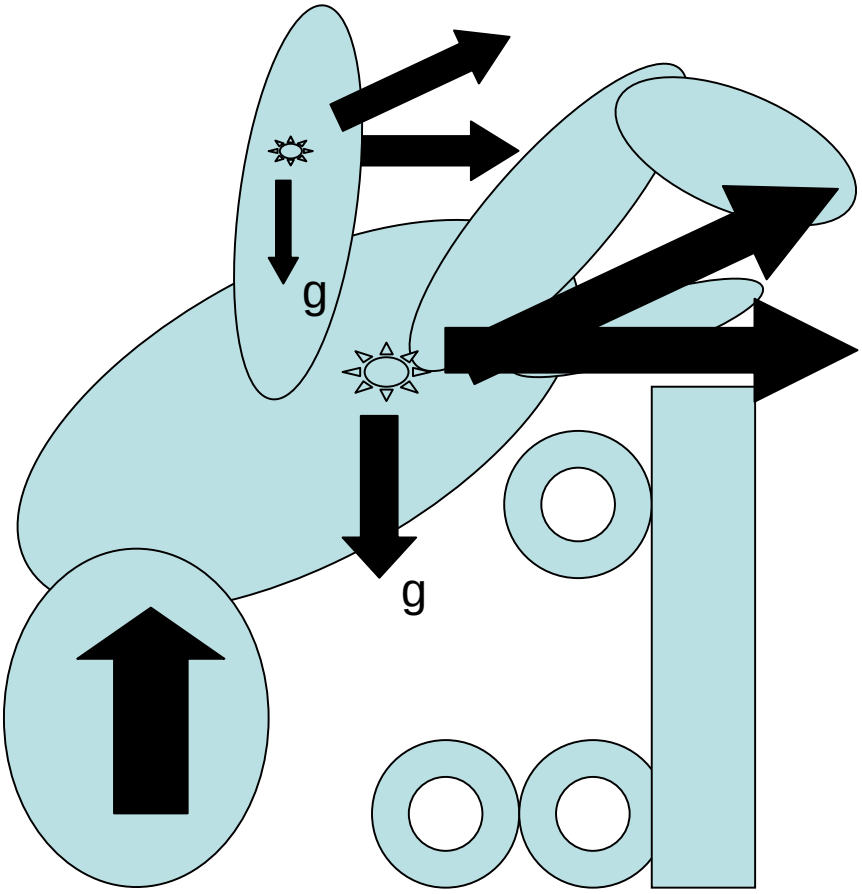
In the event of no vertical force being applied, gravity will be the only acting vertical force.

MHz (horse) transferred to the fixed fence

Mr (rider) will most likely ensure the rider continues, with no restrictive force

No change in vector associated with horse Cg, results in horse Cg being stopped by fence.
Rider Cg not subject to this resistive force continues to move due to momentum and Newton's First Rule.

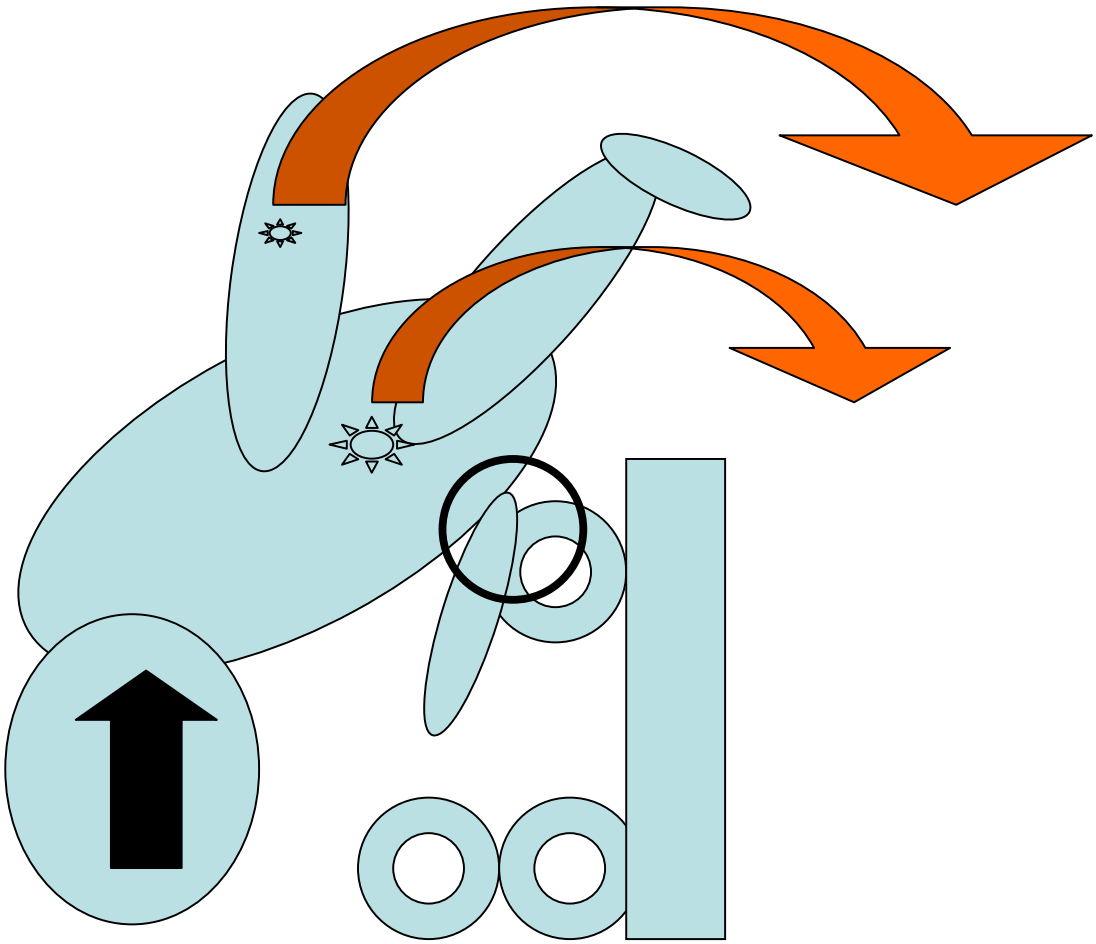
Remember just this……..



The application of a sufficient vertical force overcomes gravity and will change the vector associated with the combination, enabling them to clear the fence.

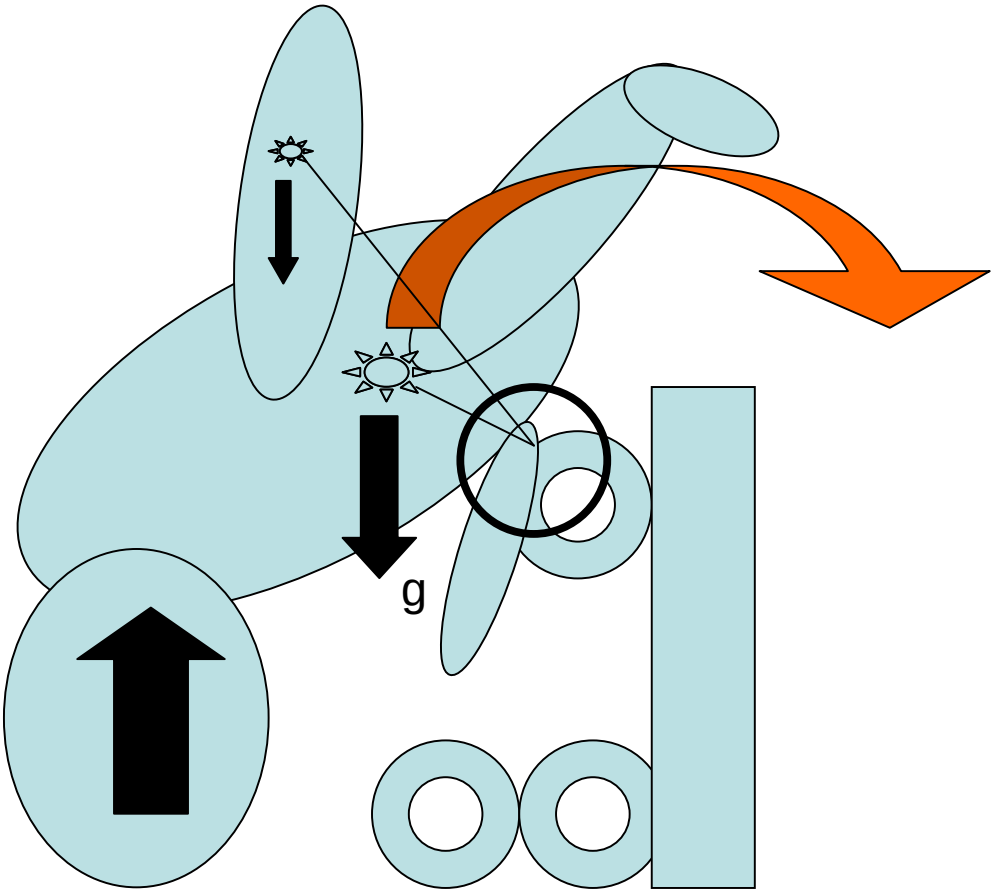
Landing is purely due to the effect of gravity

Mechanics of a linear to rotational motion translation



Change from linear to rotational motion requires the establishment of a **centre of rotation** (a point or line about which all other points in a body rotate) and therefore about which horse Cg and rider Cg can rotate.
*[**NB** Video analysis of 100 falls by U.K. based Transport Research Laboratory concluded that a centre of rotation consistent with a rotational fall only occurs when horse impacts the fence between the knee and shoulder.]*
It also assumes the application of the same forces relative to Cg.
Results in a change from a **linear** to a **rotational** motion

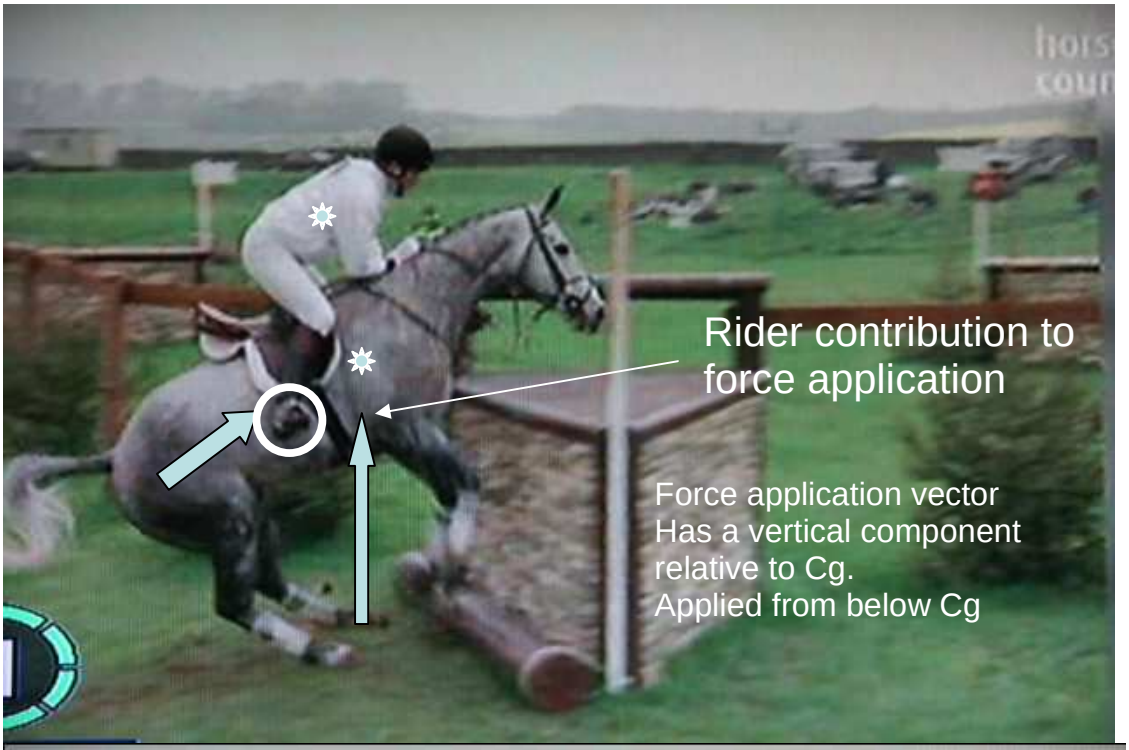
Remember just this…….



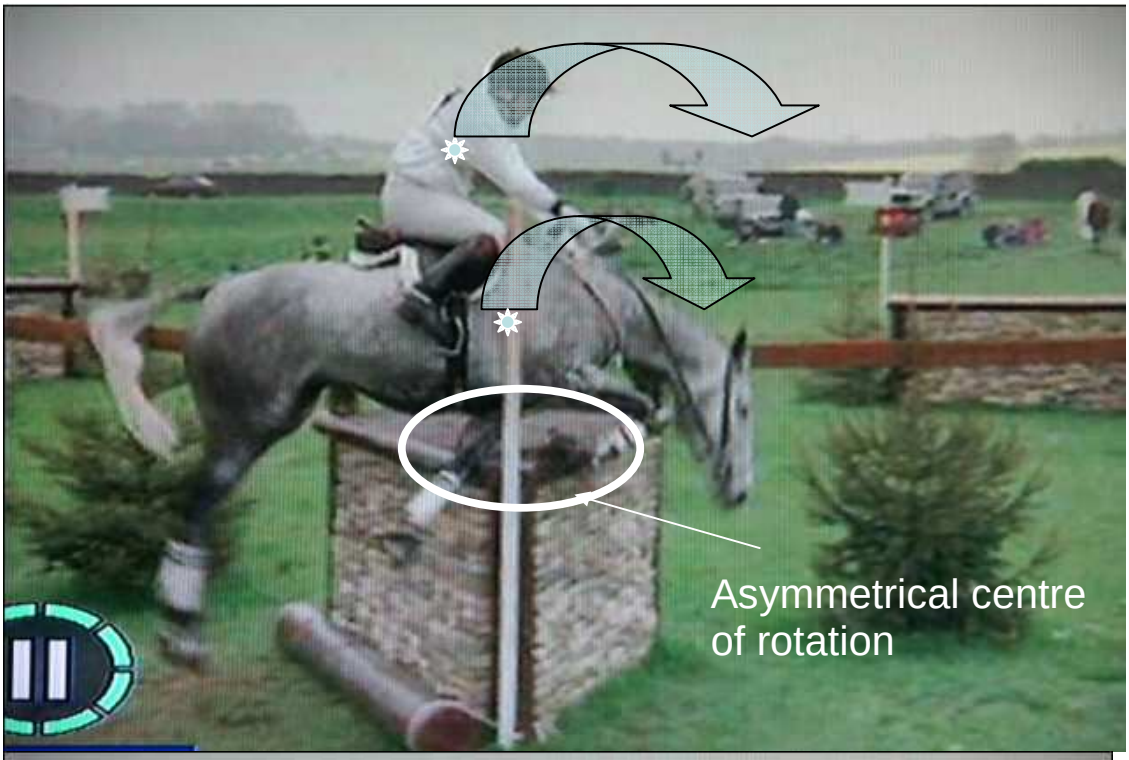
Rotational motion requires a **centre of rotation**
It also assumes the application of the same forces relative to Cg
A vertical force upward, applied to overcome the vertical force downward, applied by gravity.

Apply this to earlier sequence…..

Lowering of the forehand, (the same action as a refusal)
In preparation to change the vector to incorporate
A vertical component


Rider contribution to force application
Force application vector
Has a vertical component
relative to Cg.
Applied from below Cg


Force application continued
and consistent vertical
component relative to Cg


Asymmetrical centre of rotation


Rotational motion continues, but on two different planes, due to asymmetrical centre of rotation
9 mins


Rotational motion
almost complete


Rotational motion
complete. Cg of
horse and rider
complete motion in
two discrete vertical
planes of motion.


Remaining motion of horse largely linear in a vertical plane.
mins
mins

Key Takeaways

- Sequence illustrates necessary physical components for a rotational fall
  - Continued application of force with both horizontal and vertical component vectors
  - Vector change in the application of the force to incorporate a vertical component relative to Cg of horse
  - Establishment of a centre of rotation (a stationary point that does not move and about which all other points in the body rotate.)
- Removal or modification of any or all of these components will have an impact on the type of fall.
  - Note: - Serious injury is more likely with the establishment of a centre of rotation which is symmetrical w.r.t. Cg of horse and rider, as this leads to Cg of both horse and rider continuing in the same vertical plane.

Serious injuries are more likely to result when Cg of horse and rider are moving in the **same vertical plane.**
More likely to occur with the existence of a symmetrical centre of rotation (both forelegs impacting fence between the knee and shoulder).