

SCRUM MECHANICS, TECHNIQUE AND PROBLEM SOLVING – OR, HELPING THE ‘GIRLS’ UNDERSTAND THE ‘DARK ARTS.’

By

MARK CALVERLEY.

The author is a ‘Pom’ in New Zealand and he is currently completing the highest coaching paper (Certificate in Rugby) with the NZRFU and Massey University.

He played for Nuneaton, Warwickshire, Nottingham, Harlequins, England U18, Great Britain Students and England Students Rugby League. He is now Head of Physical Education and 1st XV coach at Wanganui Collegiate School in New Zealand.

Apologies to all female rugby players, female coaches and Germaine Greer for this title! However, as a former back, I have lived (quite happily, as it happens) with being labeled a ‘girl’ by big fat men with flat ears and over-developed foreheads and brows.

One area of the game that still remains a mystery to many is what goes on in the scrum; how do we recognise faults and how do we correct them? Those who have played in the ‘boiler room’ are best placed to coach the ‘dark arts’, but a good understanding of what goes on can be had by any coach/player, regardless of whether they are an aftershave drinker (forwards – apologies to Colin Smart) or an aftershave wearer (backs).

In a previous article I applied biomechanical principles to the analysis of technique of the scrum-half pass. It is an area in which I have experience, both playing and coaching, so my understanding of what is needed is detailed. In this instance, however, my only practical experience of playing in a scrum was gained a few years ago as a hooker whilst playing rugby league, which is not quite the same thing.

In this article I am again trying to apply mechanics to the scrum, but without using biomechanics jargon. (It can often be unnecessarily worrying for people – I know it was for me, but this probably had more to do with my old, irritable, Irish biomechanics lecturer!) It will not cover every aspect of technique and would not be a substitute for a really experienced, knowledgeable forward coach, but it will, hopefully, help and educate some coaches and players.

I have sought to keep things general and the emphasis is more on props and locks. The hooker will have some variations in technical aspects that enable him to keep the striking leg free from pressure. However, when the hooker is looking to add power and push (on their scrum or after the ball has been hooked), most of

the techniques apply. The number 8 (usually the laziest pusher in the pack) still has an important and positive role to play and he must apply the same mechanics, regardless of having nobody pushing behind him.

Flankers must adopt the mentality of being another pair of locks until the ball is cleanly won and should expect to be as efficient and necessary to the prop as his pushing lock.

I would also like to acknowledge the input of Jim Greenwood (Total Rugby), Mike Cron (the All Blacks' scrum coach) and Bruce Hiremea (Manawatu Assistant coach – NZ) from whom much of my understanding derives and from whom I have used many ideas in this article.

The 'real' 10 Commandments + 1. (Key points and player checklists for success):

1. **Eyes looking forward.** Frown and look through the eyebrows as if looking over the top of spectacles. The old adage of 'head up' can actually place the neck in a weaker position. Players in this position, crouching, will actually then end up looking up at the sky if they stand up and relax. By looking forwards *through* the eyebrows, the player is looking forward in a normal, natural horizontal manner if he were to stand up and relax, with that same neck position.
2. **Shorten the neck.** Bring the shoulders towards the ears. A short neck aids the transfer of power through the whole body and protects the vulnerability of the neck from serious injury.
3. **Push the chest out.** Get the feeling that you are trying to pop the jersey button and draw the shoulder blades together to produce a strong, flat upper back
4. **Props, get your outside arm up** and pulled back like the trigger of a gun. On the word 'engage', it fires forward in a fast, strong 'punching' motion. This will also help keep the back flat and stop the player tilting on one side or the other. Locks should be encouraged to use the 'telephone' grip through the props' legs and onto their shorts, making sure the elbow points forwards, not just straight down at the floor. Mechanically, we are stronger pulling in and around than up and down (i.e. a hook punch is harder and more forceful than an upper cut).
5. **Tilt your pelvis backwards and pull the abdominals tight and in towards the spine.** Push the backside towards the No 8, not the ground (No 8 push the pelvis back to the try line.) A small, inverted hollow in the lower back signifies the correct position and strength, but be sure not to overdo the hollow as too much is a weak and vulnerable position. Backside and shoulder line runs parallel to the ground.
6. **Keep the correct/efficient angle** between the hamstring and calf muscles at around 100-120 degrees on set-up.
7. **On engagement, keep the feet shoulder width apart and the weight equally spread.** This will be slightly different for the hooker, but feet should be generally in line, although props may want their outside foot slightly forward (about 6 inches maximum). Keep foot movement and re-adjustment to an absolute minimum on engagement. Shuffling and moving of feet results in not only potential power being lost, but also alters the balance of others as the scrum power and base shifts. For locks and back row, if you adopt a sprinter's split foot stance, then the feet should be squared up immediately on engagement when holding the pressure. This can either be done by dropping the lead foot backwards to be level with the back foot, or by chasing the back leg forward so that it

becomes level with the front foot. Either is acceptable as long as it is done immediately and does not alter good body shape.

8. **Engage as an eight (including the whole back row!) fast, together and in a controlled manner.** There should be no second or third shunt as the locks/back row 'catch up' with the front row. Have your total pack weight (mass) hitting as one controlled, efficient, fast unit exactly at the same time to increase pressure and win the vital battle of the first three seconds of the scrum. The 8 needs to stay in shoulder-to-bum contact throughout the three phases of engagement, namely pre-engagement, engagement and drive forward.
9. **Slightly drop the knees immediately after engagement.** Knees and thighs should be more or less vertical and under the hips. Dropping the knees is not a sign to reduce hip tilt backwards or to reduce the flatness of the back (lower or upper).
10. **When going forward, take small steps.** Feet in contact with the ground = power. Feet off the ground = no power. Big strides, driving the leg forwards, results in too acute an angle for snap power to be generated quickly and reduces the horizontal pushing area for any players behind. Big steps, driving the leg backwards, results in the leg angle becoming too large and the usual result is that the player pushing from behind slips up the back of the player in front and power is lost.
11. **Concentration and evaluation.** Right from pre-engagement, each and every scrum needs to be performed with focus and concentration. Every scrum needs to be thought about and evaluated and this requires some collective thought processes to decide what was good, what changes are necessary how might the opposition counter-respond.

Analysis of technique:

What follows next is a process for the analysis of technique. An experienced and knowledgeable coach can do this immediately, but those with less experience often find it difficult to spot 'naturally.' Let's not forget that the aim of coaching is to produce technically efficient, successful players, but the process needs to ensure that:

- 1) The coach *explains* the problem.
- 2) The player *sees it* and *recognises it*.
- 3) The *coach and player discuss and apply understood changes*.
- 4) The player is then able to actually *feel correct* (and incorrect) technique through his body feedback and he has *the ability to process those feelings and adapt them*.

I have found that using a mirror next to the scrum machine is a hugely valuable tool to help give players actual visual feedback on their body shape. Many players cannot visualize what coaches are saying and often have a very different perception of what they think they are doing as opposed to what they are actually doing.

Also, the use of a (digital) camera is really useful and provides proof of body shape and chronicles improvement over time. These days it is pretty easy to take pictures and then download them and alter them (as I have done in this article) using Word for Windows and simple drawing tools. It is possible to get expensive analysis packages, but is not necessary initially. Players really respond well to this type of analysis and I have found that it inspires their interest immediately and speeds up the understanding and learning process immensely. Even without a computer, an ordinary photo can be looked at and used as a tool for analysis.

Pictures 1 and 2 below show a player (the same one) in a generally good position 3 and 4 show a poor position.

Pictures 1 & 2:

Compare these two identical pictures (picture 2 has the line drawing over it) to the eleven ‘commandments’ listed above. Most of the points are covered for a position up to engagement (points 1-7 & 9.) The only criticism that I would have of this player is that he has some small curve in his lower back and needs to push his hips back even further to fully tighten the lower back and produce a strong, tight, concave shape.

His next action would be to maintain shape and tightness but lower his knees in readiness to drive forwards.



1

2

Pictures 3 & 4:

In these pictures the player is quite clearly too far away from the engagement point, resulting in his leg angle between hamstring and calf being far too big (point 6). He is looking down instead of forwards (points 1 & 2). His chest is not ‘popping the jersey button’ (points 3 & 4). His hips are sagging and not pushing backwards on the horizontal plane (point 5.) He has not pulled in his abdominals tight to help keep his lower back strong.



3

4

On the positive side, he has his feet shoulder width apart and is weight bearing equally on both feet. This will not help him in a ‘live’ situation though, as he cannot produce a snap drive as his legs are too extended. The

large angle (about 160 degrees) means that a player pushing from behind (i.e. lock, flanker or No. 8) will not be able to get shoulder purchase and will slip up the back, resulting in no power and little or no push. Because he is too far away from the contact point, his back is not parallel to the ground and his body weight is pulling him down due to the lack of support and stability. An opposing prop would easily be able to get underneath the player in this position and dominate and dictate pressure.

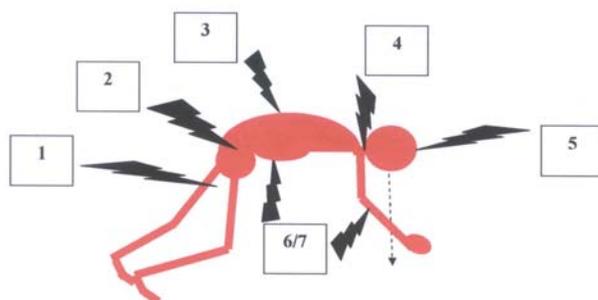
Common Mistakes.

The following pictures represent common mistakes made by many players. I have numbered examples of bad technique and labeled them with the lightning arrow. Good technique is shown by a letter and a smiley face.

Shape 1:

This is a poor shape to push from and the player may actually be in danger of injury.

1. The legs are not working together. The back leg angle is too great (as explained above.) The split nature of the legs means that balance is compromised.
2. The hips are dropping down instead of the pelvis tilting back and the backside pushing backwards on the horizontal.
3. A round back shown is caused by the lack of the previously explained hip tilt, but there is also the probable problem of not pulling in and tightening the core abdominals. The upper back roundness can be attributed to the lack of puffing out the chest, drawing the shoulder blades together and getting the elbow up and 'cocked' like a trigger.
4. The neck is long and weak and is unable to transfer power from the rest of the body.
5. The head is looking down and not forward through the 'frowning' eyebrows.
- 6/7. Stomach muscles are relaxed and need to be tightened by pulling them up towards the spine. The arm is too low and stops the chest from being expanded and 'puffed' out.



Shape 2:

This is a weak shape, but with some good aspects.

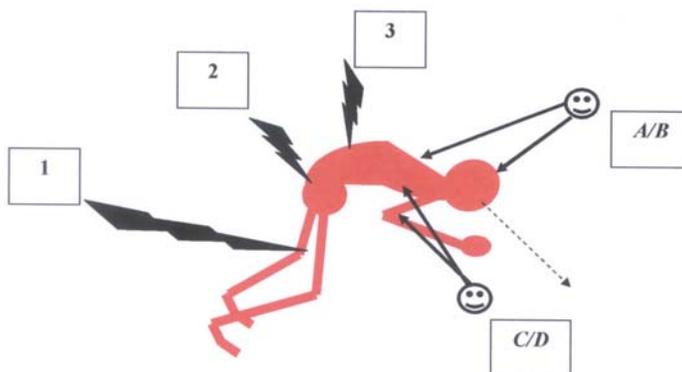
1. Again, the legs are working independently, resulting in lack of balance and an inefficient transfer of power by this player or anyone pushing from behind. His left leg is popping out, so that any push by him will result in a 'snaking' forward movement. Any player pushing from behind will force the leg further out and power will be going forward and out rather than just forwards.

2. Lack of hip tilt and backwards horizontal push.

3. A round back as a result of the poor hip tilt.

A/B. This is a nice straight upper back but it is not on the horizontal.

C/D. Arms are up and 'cocked' backwards. Chest is puffed out and strong.



Shape 3:

This is a generally good shape, but there are some unsafe habits that could lead to injury.

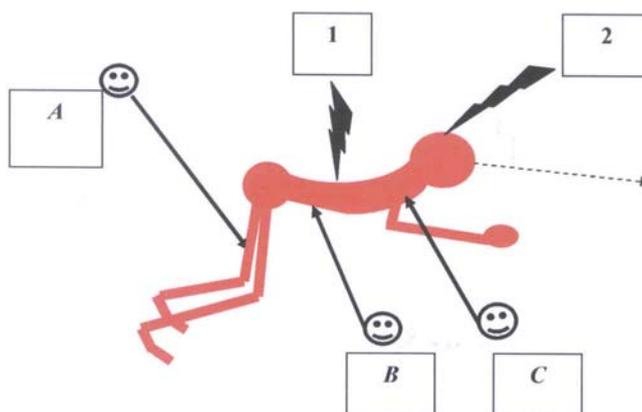
A. Legs are parallel and working together well. The player is in balance.

B. The abdominals are tight and drawn in towards the spine, enabling a strong core.

C. The chest is puffed out and ‘popping’ the shirt button. His elbows are up and back, which helps sustain a strong upper body.

1. The back curvature is too great and potentially unsafe and weak.

2. The head is looking up too much and places the neck in an unnatural and weak position. The vision line of sight is too flat and results in an unnatural head angle.



Shape 4:

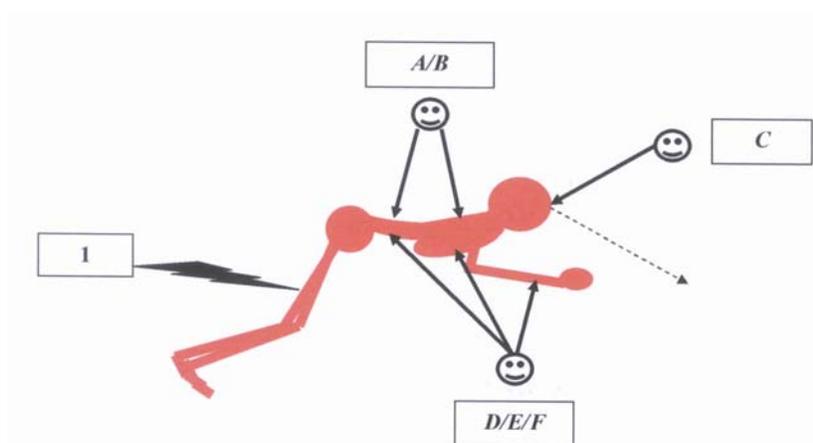
This is generally very good, except for the leg angle caused by the feet placement set too far back.

1. Legs too far back resulting in a lack of snap push. Also, any player pushing from behind would slip up this player's back, resulting in a loss of coordinated push and power.

A/B. A strong lower and upper back are shown. There is a slight concave lower back curve and a straight upper back. The line from shoulder to the hips is parallel to the ground.

C. The player has a strong, short neck and is looking forwards through the frowning eyebrows.

D/E/F. Arms are up and elbow cocked, helping to keep the upper back straight and strong. The chest is puffed out, again ensuring a straight upper back. The abdominals are pulled in and up to the spine, helping create and maintain a strong lower back shape and position.



Shape 5:

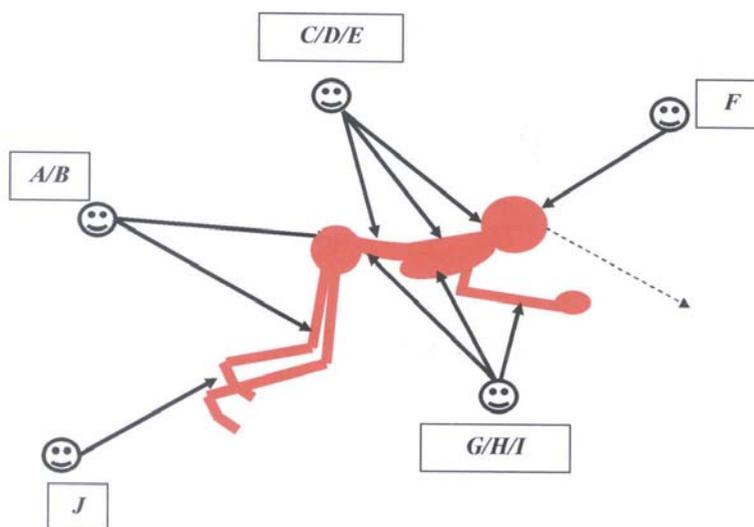
This is a really strong pushing position and also gives any player pushing on him from behind an excellent platform on which to maintain and coordinate a unified, powerful push.

A/B. Excellent hip tilt and horizontal push back. Legs work together and keep the body balanced. The angle between hamstring and calf enables a good snap shove and allows a player behind to push effectively.

C/D/E. There is a flat lower and upper back, with the hip-to-shoulder line running parallel to the ground. The neck is shortened and strong.

F. The vision line is looking forwards through the ‘frowning’ eyebrows.

G/H/I. There are signs of flat, strong abdominal core muscles. The player has puffed out his chest, ‘popping’ the jersey button. Elbows are up and cocked, pulling back the shoulder blades. All aspects lead to a strong, tight back with hip-to-shoulder line being parallel to the ground.



Shape 6:

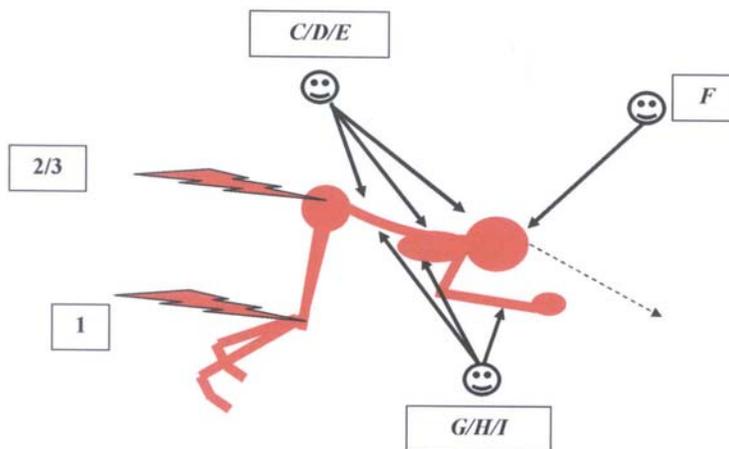
2/3. Hips are tilted backwards and relatively strong, but they are too high by being above the shoulders, which is illegal and dangerous and the power will be transferred upwards, not forwards.

C/D/E. As above, the lower and upper back are strong and well shaped. The neck has been shortened and strengthened.

F. Good vision line forwards and through the ‘frowning’ eyebrows.

G/H/I. There are strong core abdominals and the chest and elbows are up and cocked back. These all help maintain a strong back body shape.

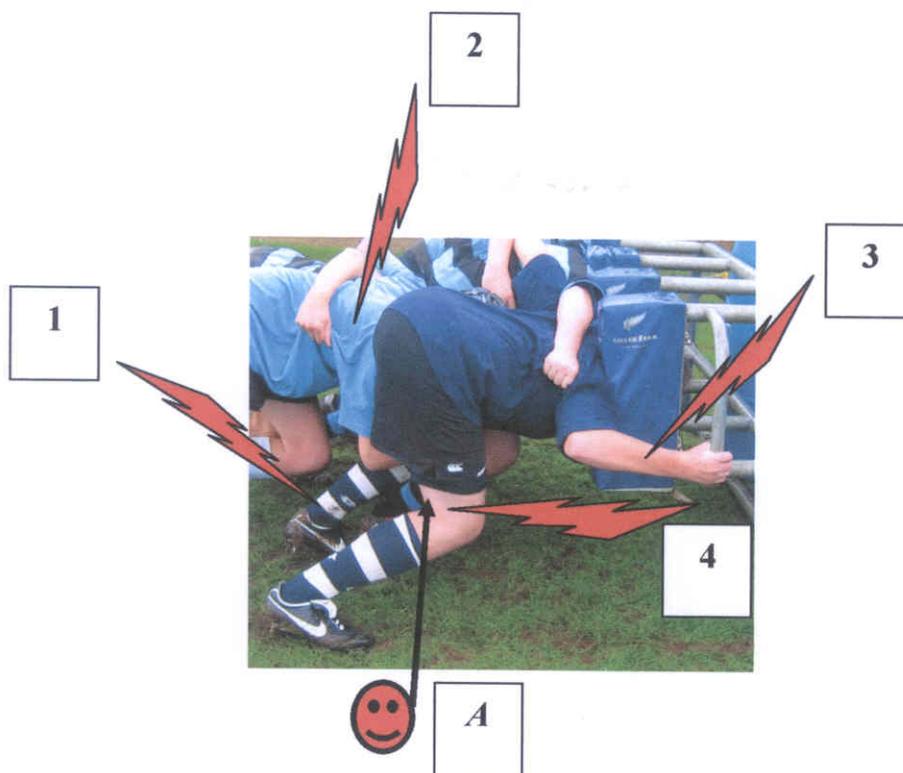
1. The feet are too close to the shoulders, pushing the hips upwards. The angle between hamstring and calf is greater than 120 degrees, again, forcing the hips up. Any transfer of power, either from the player himself or from a player pushing on him, will result in upwards movement of the hips instead of horizontal transfer of power.



The next series of pictures (5-7) highlights *some* of the problems associated with a pretty inexperienced U16 New Zealand school side. Most of these players had no idea what their body shape actually looked like, nor were aware of the fact that they were working independently of the other players. Some of these players would hope/expect to be playing strong school 1st XV rugby the following year in an U21 competition! There is some fairly obvious and necessary overhauling to be done to get them to understand their bodies and then apply good technique.

The reality is that this is not just a problem with junior players. Many senior players suffer from the same problems and poor technique. Even more fail to understand what they need to do, nor do they understand the mechanics of power and efficiency. Most work out a scrummaging style through trial, error and experience. Only a lucky few ever reach their individual or collective potential and that is a point that should concern any self-respecting coach!

Picture 5:



1. Weight is unequal. Most weight is on the right leg and the left leg is popping off the ground. This gives the lock little to push on and will pop the prop's backside out to the right of the scrum.

2. The lock is not forcing his elbow through far enough and he is also twisted, meaning that he will push the prop out and put unnecessary pressure on the hooker's hooking leg.

3. The prop's arm is too low and stops the transmission of power. It also plays no part in keeping the shoulders above the hips.

4. The knee is twisting in, meaning that any power will be going inwards and not forwards.

A. His leg angle is good and if he were square and could maintain that, the lock would have a good pushing platform.

Picture 6:



This is a pretty dysfunctional scrummage with the group of five all working independently of each other. The result is a loss of power and there is no coordinated transfer of movement and power.

1. The prop is tilted off the horizontal. His outside arm is too low, meaning he is liable to cave his left shoulder in and down and his hips out to the left, away from his hooker.

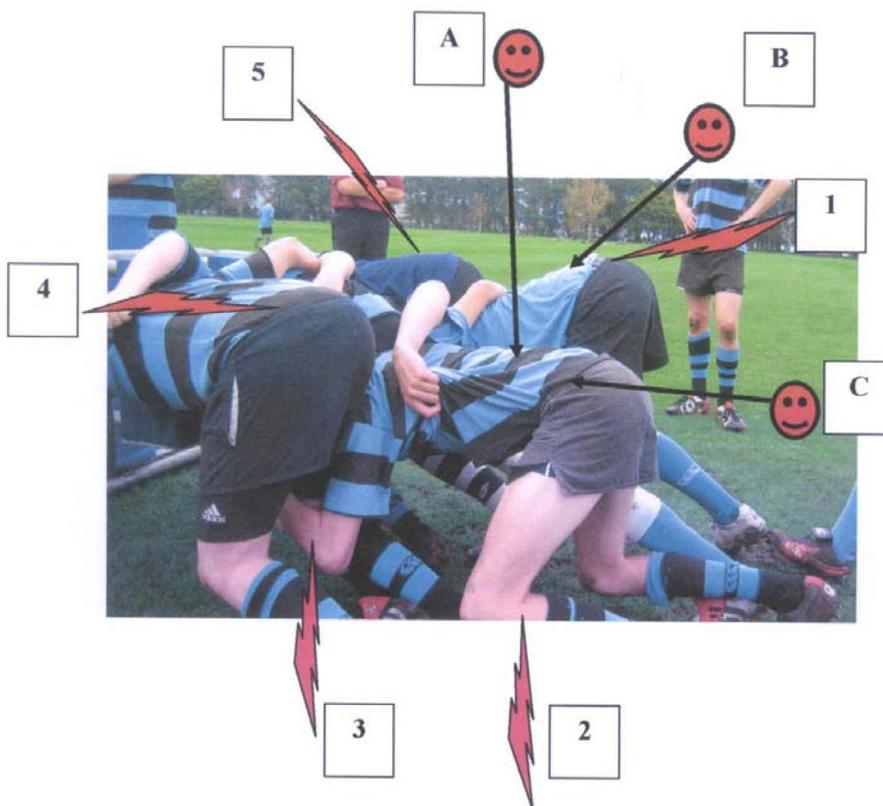
2. The lock is tilting in to the left. He is too loose with his other lock and neither one is working with the other. His power is being focused on his left shoulder, meaning it will put pressure on his own hooker; the focus should be on the right shoulder to anchor the tight head prop.

3. The tight head's foot is too far forward and he has most of his weight on his right foot. The result means he will pop his hips out to the right and the lock will have little or nothing to push on. In this case the lock is wrongly transferring his push through the hooker!

4. The loose head prop is pushing his left leg out and his left knee in. Any leg drive then pushes in, putting pressure on his hooker rather than pushing forwards and transferring pressure on to his opposition.

5. The lock's knee is pushing out to the left, meaning that the snap drive will be unequal and less powerful than it could be. It also means his weight is too much on the right leg, so he is twisted inwards to the right instead of maintaining a straight, horizontal push.

Picture 7:



A. This shows a nice back body shape with the hips tilted backwards and pushing back.

B. Hips and back are in a good shape, *but* (1) shows the hips are too high because the feet are too far forward.

1. See 'B' above.
2. Knee angle is too acute, reducing push power and the ability for the leg to absorb counter-push. The legs are unequal and operating independently of each other.
3. The elbow is not being driven through far enough, resulting in lack of shoulder-to-bum contact tightness and a resultant loss of transferred power.

4 & 5. This shows a weak, round back with not enough hip tilt and push back. The core muscles are too relaxed, again taking away from potential power transfer. Point 5 also has the tight head angling his hips out and shoulders in.

Conclusion.

Again, I stress that this article only covers a number of the core elements necessary for the safe, strong transfer of power, but the ability to record technique and transfer the information visually, not just verbally, is key.

Photography and analysis also helps coaches to work more technically one-on-one with a player, which can often be overlooked in-season as we concentrate on team practices and team dynamics.

This article has not looked at lead-up exercises and drills that can help develop body understanding, balance and strength, but these should all be elements practised regularly. Wrestling type exercises are very useful and correct technique should also be stressed.

I hope that this article has helped take some of the mysticism away from the scrum for us 'girls' and that it enables any coach to understand and correct technique and encourage player understanding and self-reliance.

The elements covered can also be applied to other areas of contact, such as tackling, clearing out, rucking and mauling. All are skills needed by both forwards and backs.

Good luck and please feel free to share your thoughts and comments with me at mcalverley@collegiate.school.nz.