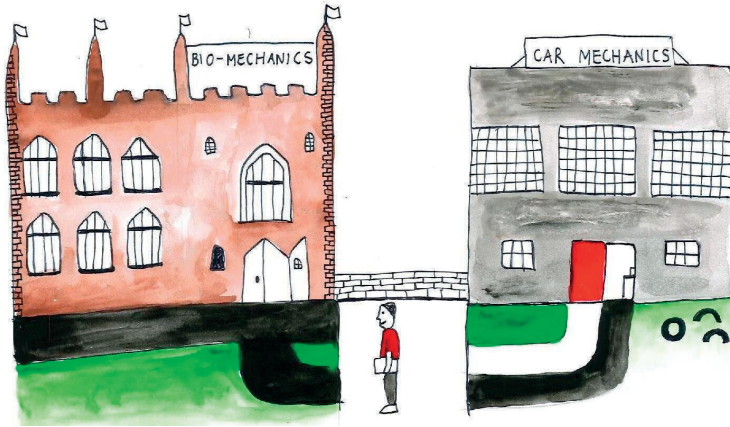
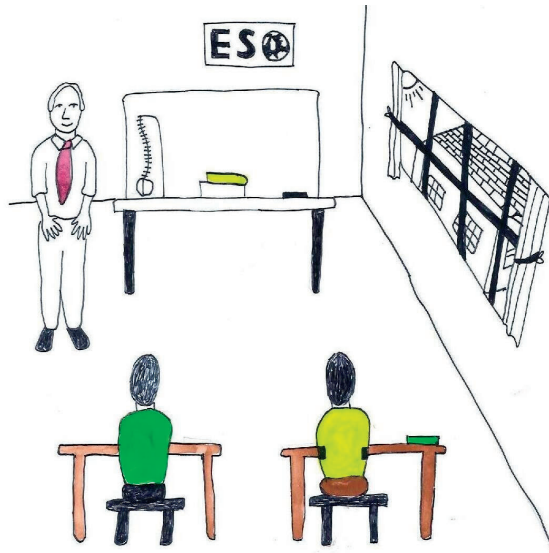


## Tip 11 - Train as a Bio-Mechanic

This *Tip* is about understanding the movements we can do across our body. It will give you an understanding on how some of these movements can combine to lead to musculoskeletal disorders whilst manual handling inanimate loads. Let's define Biomechanics ... *The mechanics of biological and especially muscular activity as in locomotion or exercise.*



I first started\* to learn Biomechanics in my first year of my Osteopathy degree. The first text I was introduced to by the Principal of the *European School of Osteopathy Renzo Molinari* was *The Physiology of the Joints* written by *Kapandji*.



\*I wish I had started learning as a 17 year old boy, with respect to weight training in the gym, Deadlifting and Squatting 120kg, damaging my body.

This was a good Book\* but I did feel it overcomplicated the subject and in this tip I will keep things nice and simple. The human body is one linked biomechanical system, a tensegrity structure\*\*. In *Sorry! We're Closed* I will only cover\*\*\* the Spine (note the capital 'S').

## Vertebral Column (the Spine)

I hear you say 'You Osteopaths are obsessed with the Back!' Well ... yes we are; it's an Osteopath's 'bread and butter' (note the capital 'O' general osteopathic council chief executive matthew redford :.p).



The Spine has the following movements:

- Forward bending or 'Stooping' (or forward flexion)
- Backward bending (or extension)
- Side bending (or lateral flexion)
- Twisting (or rotation)

The descriptions in brackets are what we use in Clinic. Otherwise, keep it simple (and more obvious to understand) with Forward, Backward, Side bending and Twisting.

\*My 'go-to' Biomechanics text is the pre-eminent *Levangie & Norkin* Book series. What Osteopathic Solutions' Expert Instructors teach in our Accredited Programmes for Best Practice lifting is supported by Levangie & Norkin. 3 more Expert Tips until *Tip 15 - Learn how to Lift Properly*.

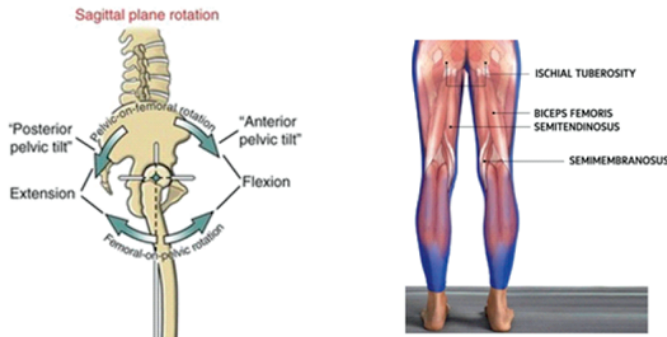
\*\*Tensegrity is a structural form with both tension and compression elements.

\*\*\*If I had covered all Joints across the body the book would have turned into 'War & Peace'! Therefore if you are interested in learning more (and you really need to be!) read my Blog post '*Human Biomechanics kept Simple*'. Go to [www.osteopathicsolutions-manualhandling.co.uk/blogs-2019](http://www.osteopathicsolutions-manualhandling.co.uk/blogs-2019)

## Forward Bending



The middle person above is forward bending to the point where they can put their palms flat on the floor. This is essentially *hypermobile*, and having a *hypermobile* spine is just as irritating to the spinal joints as having a spine that is *hypomobile* i.e. stiff. A good flexibility is being able to touch the floor with your fingers. The person to the right is bending her knees which slackens the hamstring muscles (right drawing below), which allows for more anterior pelvic tilt around the hip joint (with reference to the left drawing below).



The regions of the Spine that are most mobile in forward bending are the lower neck (C5-C7) and the mid to lower lumbar spine (L3-L5). This is due to the shape of the joint surfaces and at L3-L5 also being because of the large intervertebral discs. As the L5/S1 spinal joint is one of the Spine's most functional pivots, as Osteopaths this is the joint that we manipulate the most. You know? The technique that makes a CRACK sound!



## Backward Bending

Backward bending is commonly viewed as a hazardous spinal movement. Like any movement, if you push it too far then that is when muscle strains and ligaments sprains can happen. The erector spinae muscles (i.e. the back muscles) contract to cause a backward bend with the abdominal muscles applying the brakes.



## Side Bending

Side bending can be performed to the left and right. The Thoracic Spine is the area of the Spine that is most mobile in side bending, especially from the T1 to the T9 Spinal segments.



## Twisting

You can twist to the left. You can twist to the right. Twisting is another spinal movement that is viewed as hazardous. Again, if you twist too far then yes, it can strain spinal muscles and sprain spinal ligaments. The back muscles and oblique abdominal muscles contract to effect spinal twisting. When lifting an inanimate load, twisting your spine whilst forward bending dramatically increases your risk of a prolapsed lumbar disc (especially L5/S1). The parts of the Spine that twist most are the C1/C2 (upper neck), the Thoracic Spine (mid-back) especially at the Thoraco-Lumbar (T12/L1) Junction. There is minimal twisting in the lumbar Spine, especially at L5/S1.

## Exercise

It's exercise time!

Read 1-6; then put your copy of *Sorry! We're Closed* down (bookmark on *Tip 12*). Stand up and make sure you have some space around you.

1). Feet hip width apart with legs straight. Put your chin down to your chest and bend forward as far as you comfortably go. Do not force it!

2). Repeat this but now with your knees slightly bent (the natural, human lifting position). You can get further down, right?

3). Feet hip width apart with legs straight. Gently and carefully bend your head and neck backwards (**DON'T** do this if you easily get dizzy!) then proceed to bend backward through your lower back. Do not force it!

4). Feet hip width apart with legs straight. Gently and carefully bend your neck to the right (right ear towards your right shoulder) and then slide your right arm down your right side. Now to the left side.

5). Feet hip width apart with legs straight, standing upright. Gently and carefully twist to the right. Now twist to the left.

6). Last but not least! **DON'T** do this if you are currently suffering from a Spinal disc injury or have a history of. Now bend forwards and twist to the right (as if you are picking up an imaginary 25kg inanimate load). Maintain the forward bend and twist to the left.

What did you feel doing these movements? Good mobility? Stiff one way? Stiff all ways? Pain? Clicks?

Now below, to cement them in your grey matter, write down the 4 Spinal movements ...