

Stability and balance

Below is a list of factors which affect stability and balance in the human body. In the green boxes are aspects of practice which are important to maintain good balancing skills and stability and resilience in the system.

Stira sukham asanam Patanjali's Yoga Sutras II.46

“Asana must have the dual qualities of alertness and relaxation.” (Tr. Desikachar, 1999)

We need both adaptability and stability in the body. Joints need to be able to ‘breathe’ and adapt to the demands placed upon them during movement, while at the same time they need to be able to be stable to support the weight of the body.

Teaching points that encourage self awareness, along with a knowledge of this sutra, will help students to notice whether or not there is a balance of stira and sukha in a pose and encourage them to cultivate the one which is lacking.

Resilience

We need articulations for movement. If joints are too constrained then movement does not flow efficiently through the body. If they are too free then they are susceptible to injury. For balance in the body and in life, we are looking for resilience, which is the capacity to be reversible, to be able to move easily from stability to adaptability, within a range.

Mobilising exercises help to maintain mobility in the joints. Strengthening poses develop joint stability, particularly important for hypermobile people. As a teacher, knowledge of the appropriate range of motion for joints in the body helps us to guide students and keep them safe from injury. Working on mental and emotional resilience will also help to manifest that in the physical body.

Stabilising muscles

Stabilising (tonic) muscles are usually smaller, shorter and closer to the joint than mobilising (phasic) muscles which amplify movement. They look different under the microscope. Tonic muscles are designed for stamina and can be held in contraction for long periods of time. Phasic muscles are designed for strength and bursts of movement, and don't have as much stamina. Note that tonic muscles are also known as ‘slow twitch’ muscles or ‘red meat’ and phasic muscles are also known as ‘fast twitch’ muscles or ‘white meat’. For more on this, see here:

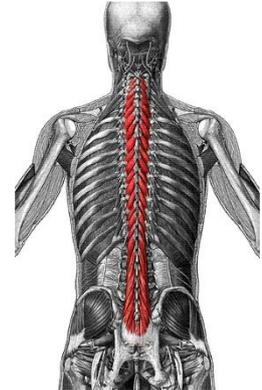
<http://www.bbc.co.uk/science/humanbody/body/factfiles/fastandslowtwitch/soleus.shtml>

Tonic muscle controls stability (with phasic muscle helping out when necessary). Phasic muscle controls movement. However, too much phasic action in the control of stability will result in restricted movement in the outer layers of muscle in the body, and probably restricted breathing. Good orientation with gravity and with the space will help the ‘outer corset’ of the body let go, and switch on the deeper stabilising muscles.

The Multifidi Muscles

The multifidi are an example of tonic, or stabilising muscles. They are situated close to the spinal vertebrae and their main function is to stabilise the spine during movement. They are also involved in controlling intersegmental motion between the regions of the spine.

Good multifidi use allows the back to be strong and stable, whilst keeping the phasic muscles free to deal with the physical activity going on and leaving the joints free to adapt as necessary.



Lack of stability

When the nervous system detects a lack of stability in the body for any reason, it will employ phasic muscles to create added stability. For example, muscles in the belly wall or the shoulders may be contracted, legs may be braced. The diaphragm also may be contracted to offer further support (which shows up as laboured or held breath). These actions create rigidity in the body, ie. more stira than sukha. Though this may have some short term benefit sometimes, eg. pushing a heavy piece of furniture, in general it makes the body less able to balance and adapt to any force placed on it.

Back pain is often caused by muscle spasm due to the body trying its best to create stability in the body, though not in the best way. Orientation is very important in asana practice for people with back or joint pain and can help relieve the pain by finding stability in a more organised way.

Orientation

A body cannot move effectively or remain upright unless it knows where it is in space and in relation to gravity. A body part cannot move effectively unless it knows where it is in relation to the rest of the body. A sense of orientation can be improved and refined.

Grounding the parts of the body in contact with the floor is important in any pose to facilitate good orientation. Working in socks will impede this. Developing body awareness and exploring poses in different ways all help students to understand where they are in space and in which direction they are reaching. Sensory awakesness is important here, so mindfulness and focus will help a lot. Reaching out into space is often limited by fear and poor self-image, so teaching points bearing that in mind can be helpful.

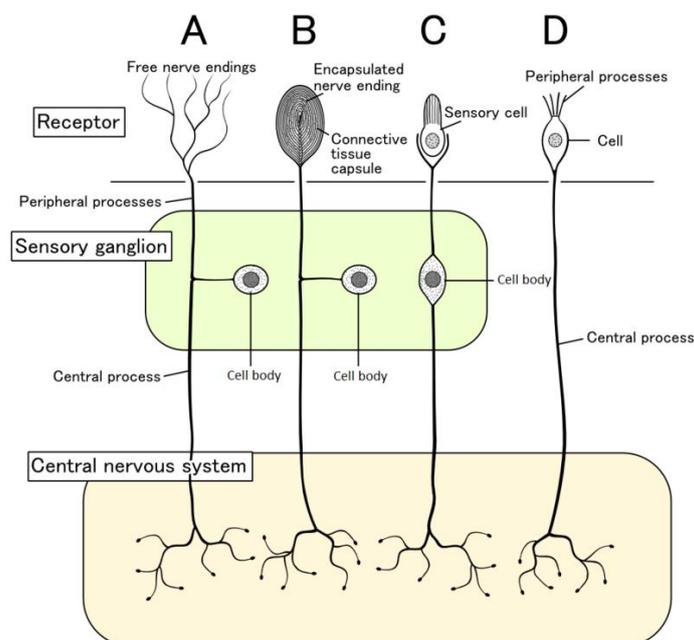
Sensory nerve endings

The body's orientation is enabled by sensory nerve endings. There are many different types of nerve receptors which each have different abilities.

For descriptions and names of many of the different receptors, see here:

<https://www.youtube.com/watch?v=2pJnrPmzNds> and here:

https://en.wikipedia.org/wiki/Sensory_neuron#Mechanoreceptors



Optical receptors in the eye are highly sophisticated nerve endings that detect light and allow us to see objects around us. The **vestibular system in the inner ear** is another sophisticated system which detects which way up your head is in gravity, as well as direction and speed of movement. Touch, pressure and vibration are detected by **touch receptors in the skin** called Pacinian corpuscles (B above). There are many of these in the skin, and a particularly large number in the hands and feet.

These are the three main ways we are able to orientate the body, and are key to balance.

If you are interested to find out more about touch perception, see here:

<https://www.youtube.com/watch?v=WXFHf9CEdb5>

Working bare foot and bringing awareness to the skin of the feet on the floor helps to heighten the sense of touch. Exercises and poses that stimulate the feet are useful here too, such as raising on to tip toes, foot massage, foot and ankle limbers, downward dog, squatting.

In dog/cat poses, making sure as much skin of the palms and fingers as possible are touching the floor will increase stimulation of the touch receptors. In other poses, the same applies to whichever part of the body is touching the floor.

Being mindful and alert in poses helps to maximise the use of the sense of sight. Not rushing into poses, but taking time to focus first is important. An unmoving focus point can help in this for standing balances. Sensory meditation and relaxation exercises, and practices such as tratak, eye exercises and eye palming, can help to heighten the sense of sight. Practices like yoga nidra which may induce pratyahara can be useful.

Data filtering

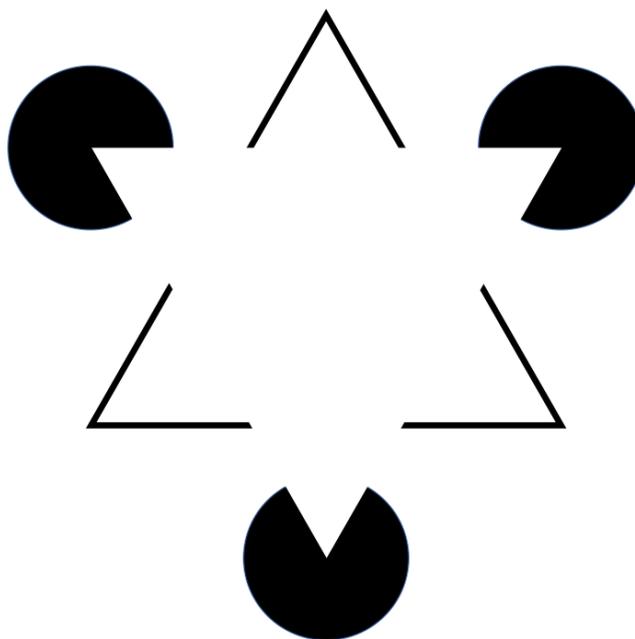
There is a massive amount of information constantly flowing into the brain from all the sensory nerve receptors all over the body. Much of this is unnecessary and unmanageable and so the brain will filter it, selecting only a proportion of the incoming bits of information that it deems important. Sometimes we can filter out too much through over-thinking or being distracted and not paying attention to our surroundings.

Mindfulness is useful here. Paying attention. Letting the mind settle. Being fully present in the pose. Noticing emotions. Noticing physical sensations. Practising one-pointedness.

Processing and perception

The filtered information received by the brain from the sensory nerve receptors, is then processed by the brain and interpreted into what is known as perception.

For example if the vestibular system indicates an upright head and pressure is felt only on the skin of the soles of the feet, the brain will interpret this as a perception of standing up. This will be corroborated by what the eyes see and by internal receptors in the joints etc. And the story of 'standing up' is formed. With this perception the body can then organise itself to walk or move into vrksasana, etc.



Perception is affected very much by body image and beliefs about the body and the world, for example 'I have bad posture' or 'no one wants to see me' will elicit a different interpretation of the standing up story and physical manifestation compared to someone who believes 'I am entitled to be here' or 'I need to show everyone how good I am'.

Sometimes perception can go awry. How many triangles can you see above? Sometimes what we think our body is doing is at odds with what it is actually doing.

As teachers we can act as a mirror for students, drawing their attention to the position of feet, to what they think is a 'flat back' is actually rounded, to tense shoulders, to arm position, etc. A person can't change what they do until they know what they are doing. We can re-educate students to find a natural ease in the body, rather than 'tucking the tail under' or 'pulling up the knee caps', or turning out feet as learnt in ballet as a child, and unwinding any learnt patterns of holding in the body.

Processing is very much affected by beliefs about ourselves, eg. 'I'm not strong enough/thin enough/mobile enough to do that pose'. Teachers can help students to learn new patterns of thought and experiencing the body in the moment, rather than according to expectations. Yama and niyama teaching can be useful here.

Emotions and physiological states will also affect this processing. For example a stressed person will have areas of tension in the body, a depressed person may tend to hang the head, any emotion will affect the breath and therefore the posture. So, any calming and focusing exercise is useful, either before an asana practice, or used as teaching points during the practice of a pose.

Control of balance

In order to remain upright in a pose like vrksasana, where our balancing skills are challenged, wobbling is necessary. This allows the sensory nerve receptors to get clear information into the system. The body needs to be able to resist or adapt to these wobbles.

The human body is a self-regulating complex system. No muscle ever works in isolation. The coordination of body movement is coordinated by the brain and nervous system, moment by moment. For more information about the organisation of self-regulating complex systems, see here: <https://www.youtube.com/watch?v=HOTWIPmkdzo>

When making a body movement, intention is key. It helps to pay attention to the start position before assuming a pose, and to focus there before moving into the pose. Awareness of the three dimensions in space, and the body's relationship to gravity in the pose are all useful. As teachers we can learn to notice which of the planes a student is avoiding, and help them to inhabit that plane by using cues or imagery, or sometimes a light touch.

Perceptual aspects can interfere with orientation. Careful use of language can be helpful here.

Stabilisation can be assisted by paying attention to directionality and grounding.

