

No 9a MORE ON BALANCE

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1. The last time I was telling you about balance. I particularly focused on the concept of the centre of gravity, *that point at which the whole weight of an object may be thought to act*.
2. I said that the concept of the centre of gravity provided us with a quite precise way of assessing whether an object is in balance and how stable that balance is. An object is in balance when the vertical line from the centre of gravity is inside its base.
3. The balance is at its most stable when this line passes through the centre of the base. It become less stable as the line from the centre of gravity moves closer to the edge of the base. When it is on the edge of the base, the object is said to be in a state of unstable equilibrium and if it passes outside the base, the object falls over.
4. Since going off balance can lead to falling which can be extremely damaging to a human being, we are well-equipped with sensory systems that tell us when we are going off balance.
5. The three main systems that do this job are: the eyes which tell us about our verticality or otherwise; the vestibular system in the inner ear which tells us about the angle of the head to the horizontal and its movement; and the pressure sensors in the soles of our feet.
6. So we have three separate warning systems – which is a reflection of how important balance is. This is an example of what engineers call redundancy – having several things which do the same job – so that if one of them fails, there is a back-up available to take over.
7. In our case, if one or even two of our balance detection systems are not working properly, we can still manage to stay in balance though less securely than if all three are doing their job.
8. Let us think of the visual sense. We have a strong inbuilt sense of the horizontal and vertical. Our eyes tell us when we are leaning forward or backward or to one side or the other; in other words when we are going away from the vertical and towards a state of imbalance.

9. We know the "crazy house" in the fairground where the misaligned verticals and horizontals can make us feel quite unbalanced. We may notice the same thing after getting a new pair of glasses. These affect the way we see the world and as a result we may find ourselves being unsure of our balance for a few days.
10. We can check the importance of our visual sense to our balance by closing our eyes while we are standing and seeing the effect. If you are young and agile this may not cause you much of a problem, but if you stand on one foot and then try it, you find that the absence of visual clues makes staying in balance much more difficult.
11. The second system monitoring our balance is the vestibular apparatus in the inner ear. The vestibular system, as well as feeding directly into our muscular control systems, interacts in a complex way with our eyes via what is called the vestibulo-ocular reflex and has a variety of subtle impacts on our perception and control of our balance.
12. Sometimes when our vestibular system is not working as well as should because we have an inner ear infection or even a heavy cold we can feel a little unsteady on our feet.
13. The third major system for monitoring our balance is the set of pressure receptors in the soles of our feet. These are called the plantar receptors – the word plantar means "*relating to the sole of the foot*".
14. If we think of the soles of our feet, we realise that they give us a very good sense of the orientation of our body in space. We can tell whether we are leaning forward or back or to one side or the other.
15. Together, these three systems, the eyes, the vestibular system, and the plantar receptors in the soles of the feet, provide us – or the nervous system – with a continuing and very accurate sense of the orientation of the body in its environment.
16. They also alert us to when we are going off balance – when we could be putting ourselves in danger of falling. And we have a very quick response to them when they warn us. Our immediate response to a feeling we are going off balance is to stiffen and stop the movement that is taking us off balance.
17. I can then take compensatory action to bring my centre of gravity back towards the centre of my base.

18. Let us now look at a few practical examples of the balance system in action. Think of walking along a straight line, putting one foot carefully just in front of the other.
19. Because our feet are arranged in this way, our base is very narrow. This means it is very easy for our centre of gravity to move outside it if we sway in the slightest to either the right or the left.
20. If this happens and, for example, we find ourselves toppling to the left, our balance systems prompt us to take remedial action by straightening ourselves up and sticking out our right arm. This may take us too far to the right and we lean to the left and stick out our other arm.
21. We may experience it as a rather panicky waving of our arms about and leaning this way and then the other. But if we analyse it carefully, we can see that we are automatically trying to bring our centre of gravity back inside our base.
22. When an untrained person does it, there is a lot of overshoot and they wobble and wave their arms all over the place. But when trained dancers and acrobats do it in a controlled way, we can see what is happening more easily.
23. Let us now look at when we stand with our feet in their normal position and lean forward, bringing our centre of gravity towards the front of our base.
24. We find ourselves automatically stiffening. The more I lean forward the more I stiffen. If, in addition, I put my arms out in front of me, I stiffen even more. My body is resisting my going off balance.
25. But we have other options available besides stiffening. We can stick our bottom backwards and that will bring our centre of gravity back into the comfort zone in the centre of our base.
26. In order to stick our bottom back we have to release our ankles, knees and hips. A small child picking up something from the floor does this automatically but a surprising number of us do not do so, especially as we get older. Picking up something becomes much more of physical effort.
27. We also have a head which weighs around four kilograms so it is important that it is in exactly the right position to help us stay in balance as we go through with whatever we are doing. The question is how should we hold our head while we are sticking our knees forward and our bottom back.

28. The answer is we do not know. There is no fixed “correct” position for our head as we go through manoeuvres like these.
29. But the body’s balance systems sense exactly where our head should be at every instant. This is why rather than putting our head into a fixed position, we allow it to be free on the top of our neck so that the various muscular systems involved in balance can put it exactly where it should. In this way, the head provides the body with a very subtle means of fine adjustment to help it stay in balance.
30. When we are nicely organised in a state of balance, our balance sensor systems can stop shouting warnings at us and our musculature can relax. As a result, the amount of internal neuromuscular noise in our nervous system is reduced to a minimum.
31. This means we are in a proper state to sense what is going on in our pupils and provide them with the gentlest guidance on how they use themselves in getting in and out of a chair.
32. You will notice that by following this analytic road we have arrived at a way of balancing and quietening ourselves which a long time ago Alexander’s pupils christened “*monkey*”.
33. Monkey is a dynamic way of keeping ourselves in balance as we go through the various actions involved in giving an AT lesson. I say “dynamic” because monkey is not a fixed pose; it is a way of enabling us to adjust to the needs of staying in balance as we go about our AT work.
34. The interesting thing is how much scientific sense it makes when we analyse it in this way. We find this is true of so much of the procedures and practice of the AT when we look at it within a neuroscientific perspective.
35. But, I can hear you say, this monkey you are describing bears no relationship to the agonising monkey I experience when I am working in a training group. All my muscles, especially those in my thighs, ache unmercifully after a couple of minutes. How can this be the optimum position for detecting what is going on in other people?
36. It’s the old question of faulty habits. If you look at small children, they spend a lot of their time in monkey. It is, in fact, a very natural and balanced state. As we grow up, school, computers, the wrong kind of shoes, shop and office work wear and tear, and growing older tend to stiffen and rigidify us.

37. The aches and pains we suffer as we go into monkey are our muscles relearning what they once did automatically. I promise, it gets easier as we get further into the training.
38. Finally, I promised I would come back to the question of stable and unstable equilibrium. Because “stable” is such a positive-sounding word, we automatically tend to think that stable equilibrium is better than unstable equilibrium. But we need to be careful about that and this is a point that Walter Carrington used to make.
39. If we are in a very stable equilibrium, it is more difficult for us to move from one position to another. We can see this if we put our feet wide apart which widens our base and tends to put us in a more stable equilibrium. As a result we have to make a bigger effort to move ourselves which means more muscle tightening and stiffening.
40. Walter was very clear that too much stability in our equilibrium can be a bad thing and he used to extol the virtues of what he called “toppleability”.
41. There is obviously no strict rule about any of this or the degree of toppleability we should have at any given moment. It depends on us as individuals and the circumstances in which we find ourselves. I suppose the best way of summing it up is to say that we need to have a balanced view about the question of balance.