

No 17 Rudolph Magnus (II)

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1. Last time, I introduced you to the neurophysiologist Rudolph Magnus who worked in the University of Utrecht in the Netherlands. Today, I am going to continue with him.
2. I told you how, after spending his Easter vacation in 1908 working with Sherrington in his laboratory in Liverpool, he devoted most of the rest of his research life to working out the neuroscience of posture.
3. As we know posture involves a surprisingly large amount of complex neuromuscular activity. In normal human life it involves both voluntary, or conscious, decisions and the working of our reflex systems. Magnus' research was focused on the reflex elements.
4. You will also remember that most of the experiments were conducted on animals from which the cerebral hemispheres, the thinking parts of the brain, had been removed. So the behaviour Magnus was observing was necessarily reflex.
5. In presenting his results in the Croonian Lecture in 1925, Magnus chose to look at the organisation of the postural process under four aspects. As AT teachers we can relate to them easily. They are the sort of things we explore in quite a few of our games.
6. The first of these he called "*Reflex Standing*". About this, he says:

In order to carry the weight of the body against the action of gravity, it is necessary that a certain set of muscles, the 'standing muscles' should have by reflex action a certain degree of enduring tone, to prevent the body falling to the ground.¹

7. If I am simply standing, there must be a sufficient level of tone in the standing muscles to resist the downward pull of gravity so that I do not collapse in a heap on the ground. You will remember that tone or tonus is the level of tension in a muscle when it is keeping its shape but not actively doing something.
8. The second aspect he called "*The Normal Distribution of Tone*". He says:

¹ Magnus (1925)p339

*In the living animal not only do these standing muscles possess tone, but also the other muscles of the body, especially their antagonists, the flexors. Between these two sets of muscles a certain balance of tone exists so that neither set of muscles gets too much or too little tone.*²

9. In other words, standing properly is not just a question of being in the upright. There should also be an appropriate balance between the extensors and the flexors. They should not be competing madly with each other keeping me a state of rigid tension. They should be doing just enough to keep me in a nicely relaxed state of balance.

10. The third aspect of posture Magnus called “*Attitude*”. About this he says:

*The position of the different parts of the body must harmonise with each other; if one part of the body be displaced, the others parts also change in posture, so that different well-adapted attitudes, evoked by the first displacement, will result.*³

11. In my case, if I move a bit of me – if I lift my arm, or twist my head – my reflexes will bring about an automatic adjustment of all the other parts of my body so that my overall posture comes back into a balanced and harmonious state.

12. The fourth aspect of posture Magnus called “*The Righting Function*”. About this he says:

*If by its own active movements or by some outside force the body of an animal is brought out of the normal resting posture, then a series of reflexes are evoked, by which the normal position is reached again.*⁴

13. This is a more dynamic aspect of posture. He meant that if someone comes and gives me a push, or if I do something which takes me out of my balanced standing posture, the righting function takes me back into the balanced posture again.

14. Distinguishing these aspects of posture from each other helps the scientific investigation of how they are controlled by different parts of the brain but they do not occur in isolation

² Ibid.339

³ Ibid.340

⁴ Ibid.340

from each other except in laboratory animals. In normal posture they take place together and interact with each other.

15. Magnus also looked at the influence of movements of the head on the rest of the neuromusculature. He found that when he moved the head of one of the experimental animals up, down or sideways this had an automatic effect throughout the whole of musculature.

16. He said:

*The mechanism as a whole acts in such a way that the head leads and the body follows.*⁵

17. These are interesting findings but the story is more complicated because even reflex posture does not happen in a sensory vacuum. At the same time as the brain is sending out the signals which control these aspects of posture, there is a huge amount of sensory data coming into the nervous system. This comes from the various sensing systems and organs throughout the body.

18. One set of these sensors is collectively called the proprioceptors – they tell the brain about what is going on in the body itself.

19. They include the vestibular apparatus in the inner ear which responds to changes in the position and movement of the head. We also have a large variety of organs in the joints and muscles – muscle spindles, tendon organs and different kinds of pressure sensors – which respond to change in the tension and pressures in the various parts of the body, especially the muscles and joints.

20. We have a particularly large number of pressure-sense organs in the soles of our feet which respond to changes in the way our weight is carried by our feet – for example, whether it is forward on our toes or back on our heels.

21. Nor must we forget the skin which responds to a wide variety of external conditions such as temperature. It is also sensitive to a large range of different kinds of pressures from the sensation of an insect walking on it, to an AT teacher's hand, or the kind of things that happen in the Piccadilly Line during rush-hour.

22. We also have what Sherrington calls the teleceptors, the sensors which tell us about things outside the body. In our case

⁵ Magnus (1926b)p588

the most important teleceptors are the eyes, but for dogs, the nose is equally if not more important. Other animals which are active in the dark depend much more heavily than we do on their sense of hearing.

23. So as the brain is sending out the signals to adjust the tone and attitude of the body, floods of impulses are coming into it from the proprioceptors and the teleceptors as the body adjusts to its own changing neuromuscular state and responds to the changing conditions in its environment.

24. This means there is a huge data-processing task involved in handling and harmonising all these data flows coming into and going out from the brain so that the body is maintained in a continuing state of harmonious posture.

25. What Magnus said was:

*In fact a very finely elaborated central apparatus is needed to combine and distribute all these afferent impulses, depending on and adapted to the always changing circumstances of environment.*⁶

26. He gave more detail in *Body Posture* and said:

*The result of the present study is that in the brain stem, from the upper cervical cord to the midbrain, lies a complicated central nervous apparatus that governs the entire body posture in a coordinated manner. It unites the musculature of the whole body in a common performance.*⁷

27. We could spend a lot of time discussing various details of this – and we'll come back to some of them the next time – but for now I want to focus on the extremely important point that the central apparatus processing the data and controlling all these aspects of posture is in that area of the brain from the entry of the spinal cord into the skull to the midbrain – the brainstem.

28. In other words, all this brain-processing relating to posture is, or can be, carried out without any involvement by the cortex, the conscious thinking part of the brain. Complex though they are, these are reflex functions

29. This, at first sight, may seem rather odd since it is normally taken for granted that the cortex should be involved in the more important activities of human beings. Staying upright and using

⁶ Magnus (1925)p340

⁷ (Magnus 1924)p653

the body in a balanced and harmonious way are such important aspects of living that one might think that posture should be subject to the conscious control of the cortex.

30. But Magnus argued precisely the reverse and says that in the case of posture:

It seems to be of the greatest importance, that the whole central apparatus...is placed subcortically in the brainstem and by this means withdrawn from all voluntary action.⁸

31. The reason is that when we consciously decide to do something, the motor cortex sends out the necessary signals and the muscles contract and do whatever is necessary to perform the action. These conscious actions override or displace the postural reflexes.

32. But when the action is over, Magnus says:

“The brainstem centres... restore the disturbance and bring the body back into the normal posture so that the next cortical impulse will find the body prepared to start again.⁹

33. In other words, when we have completed the action and are no longer interfering with the operation of the inbuilt reflex postural mechanisms, they do their job and get things back to the normal resting position again. We are back in tune with ourselves and ready to do the next thing.

34. The postural reflexes thus have a vital restorative role. If we look at a squirrel nibbling a nut we see it pulling itself inwards and downwards. But when it has finished and thrown away the empty shell, its postural reflexes kick into action. It opens itself up and gets back into its normal posture and goes about its business.

35. Magnus also talked of the role of the postural reflexes in what he called “recalibrating the senses”. This process is necessary because when we perform an action not only is the normal resting relationship between the body parts changed, the body’s relationship with the external world is also changed.

36. The way he puts it is:

⁸ Magnus (1925)p349

⁹ Ibid.349

By the action of the subcortical mechanisms described in these lectures the different sense organs are always brought into the normal relation with the external world...The result of all these arrangements is that the sense organs are righted in relation to the external world...In this way the action of the involuntary brain-stem centres plays a very important in conscious activities, especially as regards spatial sensations.¹⁰

37. This shows us the significance of the postural reflexes. They need to be working properly if we are to function as properly integrated human beings.

38. This is at the heart of the AT and gives it its special characteristics. It is why Walter Carrington said

The whole basis of Mr Alexander's Technique is the teaching of how to eliminate interference with the autonomic functioning of the organism.¹¹

39. It is also why it is often said by AT teachers that if we stop doing the wrong thing the right thing does itself.

40. The problem is that though these are absolutely correct as statements, they are a lot more easily said than done. This is because as human beings we have a uniquely powerful capacity to manipulate our neuromusculature in various ways that are impossible for other animals.

41. A squirrel or a guinea-pig has little freedom of manoeuvre in how they use themselves. They remain largely trapped in their natural reflex endowment and are only able to use themselves in a mainly stereotyped way. A dog is more versatile and can be taught a few more ways of using itself but is still not going to become a ballet dancer.

42. But as human beings, we can use ourselves in a huge variety of ways. We can learn how to sit, run, stand and carry out a variety of activities which are quite contrary to the natural harmonious working of our neuromuscular systems. We can learn them so thoroughly that they become habits.

43. The problem is that a habit is like a reflex. Once it is learned or embedded, it happens without thinking. This brings us to

¹⁰ Magnus (1926b)p588

¹¹ Carrington (1994)p52

Alexander's concept which he variously describes as *faulty* or *deceptive* sensory appreciation.

44. In a passage in *The universal constant in living* Alexander says:

It is well known that different people will get a different conception from the same word, spoken or written, and from the same gesture, showing that conception is dependent upon the nature of the impressions taken through the sensory mechanisms which control the functioning of the cells (receptors and conductors) of the eyes, ears etc. The conception likewise of what is happening within ourselves is dependent upon impressions which come to us through the sense of feeling (sensory appreciation) upon which we must rely for guidance in carrying out our daily activities.¹²

45. Alexander goes on to say:

When a certain degree of misuse has been reached, the deceptiveness of these impressions reaches a point where they can mislead us into believing that WE ARE DOING SOMETHING WITH SOME PART OF OURSELVES WHEN ACTUALLY WE CAN BE DOING SOMETHING QUITE DIFFERENT. This is equally true of things we believe we think, which more often than not are things we feel.¹³

46. The practical result of the years of hard work we put into learning our bad habits, is they increasingly displace and override our reflexes and we do not have any ready or easy means of distinguishing between them. As a result of the "faulty sensory appreciation" we have developed in ourselves we come to a stage when we think we are allowing standing to happen but we are actually doing our standing in our habitual way.

47. This is where we come into as AT teachers. Our role, if you like, is to lift habit into consciousness so that we can alter it or get rid of it. This is not an easy task. It is why we have AT teacher-training schools and why pupils generally need to have more than one lesson.

¹² Alexander (1946)p24

¹³ Ibid.24

48. One of the most interesting experiences as we proceed through the training course and our development as teachers is the way in we become increasingly aware of the ways we and the people we are working with interfere with the autonomic functioning of the organism. Walter said that even after sixty years he found out something new every day.
49. To me it is both interesting and deeply satisfying that what we do is firmly rooted in Magnus' and Sherrington's discoveries about the workings of the postural reflexes. It means we have a firm foundation on which we can continue to build a scientific understanding of the Technique.
50. In the next talk I am going to look at what Magnus called the *physiological a priori* and the remarkable extent to which it parallels Alexander's concept of faulty sensory appreciation.
51. From reading his later writings I think that if Magnus had lived, he could well have come closer to the AT. That did not happen but there is a nice little epilogue to the story. Walter Carrington said that Magnus' grand-daughter came to him for lessons. I do not know her name or when it happened but it's another little bit of interesting research in the archives.
52. In the next talk, I will also look at the relationship between what Magnus described as a *central apparatus* in the brainstem and what Alexander described as *the primary control*.

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