

Institute for Human Functionality of Motion (HBF)

THEORY HBF

Below is a brief outline of the four points presented in the introduction.

1. The viewpoint of functionality

Functions of posture and movement are not explicable on account of joint and muscle functions, not even when the coherence between them is set out as a complex, interactive structure in which reactions, aided by various proprioceptive and exteroceptive reflexes, are induced by autonomous external stimuli. The danger in this case is that treatment might then be based on the mechanical (morphological, orthopaedic, or purely physiological) components of the motor apparatus, even when there is no question of objective and demonstrable morphological deviations calling for disease-specific treatment.

The term motor apparatus is therefore a crippled term. Posture and movement are not the result of a working apparatus.

Posture and movement are forms of behaviour of animals and humans, which in the first instance are determined by the entire way of existence of that subject which moves itself.

The way in which that subject moves itself depends on the way it transforms its surroundings into a self-determined proper situation. By means of unconscious, bodily experiences corresponding initially with evolutionary selected likes and dislikes, the subject has discovered and attached vital values and importance to its own environment.

Consequently the way of existence of the moving subject corresponds to an entirely proper world view. It is from that particular, valued world view that posture and movement get their real determination and explanation. Posture and movement find their starting-point in the concrete significant relation with which a self-functioning individual enters into its own environment.

Posture reflexes and biomechanical tunings are important, but not as self-acting automatism. They are (as Buytendijk calls them) "appliances" which may be used (or not) in a good or in a

bad way, on the base of the topical significance-relation between the self-moving subject and its situation.

When biomechanical laws are broken and as a consequence of that complaints arise, the cause of those complaints is often not found in the

(as result) badly functioning segments of motion, but in the manner the subject gives shape to its environment in a non-natural way. That doesn't demand repairs of the 'motor apparatus', but it asks for repairs of the attitude of the subject towards its environment. Of course that wrong attitude may already have caused so much damage that that attitude is not to be repaired in a simple way.

2. The notion of positionality

The viewpoint of functionality described under point 1 is not only applicable to the human movement, but also to the animal movement. In the notion of positionality the difference that is only demonstrable in the human movement comes up for discussion. Owing to this the addition 'human' in our name gets its pregnant denotation.

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The notion of positionality is borrowed by Buytendijk from the anthropological philosopher H. Plessner, who makes a difference between eccentric and centric positionality.

De Graaf and Verberk have given this notion an empiric elaboration and made it suitable to describe apparent-different forms of behaviour of motion. With that two positions can be distinguished that means two forms of positionality.

The shortest description of the two positions is as follows:

In centric positionality I am a body, which functions.

In eccentric positionality I have a body with which I function as with an instrument.

Those different positions are apparent in all earlier acquired behaviour of motion – such as walking, balancing, stooping, seizing, writing, cycling and so on. When I'm cycling in a centric positionality there is (as long as nothing special happens) no attention at all given to the many complicated movements, necessary to keep one's balance and to move forward in a particular direction. There is not any distance between myself

and the functions of motion I execute, for I am completely that moving, functioning body.

That way of being bodily active is the centre from where I live at the moment.

As regards those functions of motion I am in centric positionality, for that 'I-function' is as it were submerged in it. From that centre I can focus my entire functions of attention on the landscape or on all that has nothing to do with my cycle-movements.

The behaviour of motion of animals is always motion in centric positionality. That has, also with humans the characteristics of a safe and secure progress, as if it goes automatically. And that is also explainable from the organisation of behaviour of the brain, which we'll discuss later in point 3.

Those characteristics get lost with movement in eccentric positionality. When I move in eccentric positionality there is an I-function which doesn't absorb in the function of motion. There is an I-function which controls the movement itself. Then there is really a 'motor apparatus' which is controlled as if it were an instrument with which motion targets are realized.

You just have to think for example of someone walking with a very painful foot to recognize this eccentric control. In that case full attention is given to the walk-movements themselves in an attempt to execute these movements in such a way that they cause as little pain as possible. Pain-experience is only an example, though very important in this context. However, the more general headword is here: experienced insecurity. The fact is that an eccentric control-position comes compulsively into being as soon as ever the situation is appraised as being insecure. This evokes a watch-function in all behaviour of motion at once.

This needn't necessarily disturb a healthy functionality of motion, on condition that it is limited to momentary interventions, in specific concrete functions, on account of acute function-demands owing to transitory situation-features. However, if such an experience of insecurity is not limited to momentary actions, it often results in a permanent watch-function which causes that the subject cannot approach the normal movements in centric positionality. This is called persistent eccentric positionality. Such a persistent eccentric positionality ends basically in a great many dysfunctions of the body, not only in posture and movement. Painful complaints may easily become chronic. Under the next point (about functions of the brain) we'll come back to that dysfunctionality.

(The behaviour of motion loses the described characteristics of a safe and secure progress as well in animals with a painful paw. But the qualifications of an eccentric positionality, as stated above, are far from demonstrable in animals. The odds are, that the fixed functions of motion are defeated by the sensations of pain and that the attempts to evade the pain are pure reflexes. Anyhow, a persistent eccentric positionality is out of question in animals. And only a persistent eccentric positionality is aimed at in our theory.)

3. Brain functions and functions of movement.

Views of a modular organisation of the brain are the trend. We don't follow that trend.

Israel Rosenfield ("The invention of memory. A new view of the brain", New York, Basic Books, 1989)

writes: "Many, if not most of the psychologists and neuroscientists, are convinced nowadays that the brain consists of separate functional unities – called modules, which may be or may be not anatomically located"(chapter 1), so that "our brain executes tasks by solving many independent problems, which altogether make up the general task(chapter 3). " They have almost succeeded in creating a dogma."(preface).

In 1970 J.J.G. Prick in the "Nederlands Handboek der Psychiatrie" (Dutch Handbook of Psychiatry), part 4, (Van Loghum Slaterus) still thought that this viewpoint was outmoded. "The views in relation to the doctrine of functional localisation of the cerebral cortex have been discarded in the present space of time. It is a general acknowledgement now that in the cerebral cortex no psychical and bodily activities are located; and furthermore that as such they are not available" (page 357). "We remarked many times before that the human existence 'makes' its own cerebral physiological organisation" ... (page 364)

There are three research domains, in which the old-fashioned theory of modularity has popped again :

1. The clinical research of specific loss of function with well-defined brain damage.
2. The research in which the metaphore of 'the brain as a computer'(formerly steam engine, telephone exchange et cetera) is simplistically used as a useful description of the real function of the brain.

3. The use of modern brain scan techniques, such as PET and fMRI (which produce nicely-coloured pictures) to find the places in the brain in which the functions of movement and cognition might be located.

A number of brain-researchers, whose names we have mentioned before, prove that the theory of modularity frequently accepted with open arms is wrong.

Very recently, in December 1999, F.H. Lopes da Silva, professor of neurobiology at Amsterdam, warned against these ideas (NOW/Huygens Lectures, the Hague). Speaking about PET and fMRI he says: "..... can contribute to forming a static image of the brain as consisting of series of areas identified as 'centers' of cognitive functions, similar to what we see in the old pictures of the phrenology. In other words, the phrenology ghost looms in the background."(page 27)

Concerning vital behaviour we join in with the theories of G.M. Edelman. (After a first start in 1978, followed:

"Neutral Darwinism" in 1987,

"The remembered present" in 1989,

"Bright air, brilliant fire: on the matter of the mind" in 1991,

and (together with G. Tononi) "A universe of consciousness" in 2000.)

We repeat here the sentence written in giving a description of the viewpoint of functionality:

"By means of unconscious, bodily experiences corresponding initially with evolutionary selected likes and dislikes, the subject has discovered and attached vital values and importance to its own environment."

Edelman speaks with that about the formation of 'global mappings' in the brain. Those 'global mappings' are indivisible complex meshworks in which cell groups everywhere in the brain always participate, in the cortex as well as in the midbrain, in the cerebellum and in the nuclei of the brain stem. Of essential importance with this are the numerous reciprocal connections between all those cell groups. Edelman calls this "reentry". The most important thing with this is that perception and movement in these global mappings are inextricably bound up with each other, in one functional dynamic system, in which on the one hand the way how to learn to perceive is dependent on the functions of

movement and on the other hand the result of the perception defines the specifications of movement.

(Edelman emphasizes that one should not understand "reentry" as a form of feedback, by which there is no question of the synchronous to and foreciprocity of reentry.

(There is positively and even necessarily a question of sometimes clearly located function- specialisations in the participating cell groups. However, there is no connection at all from that with shapes of behaviour. Those specifications can only lead to behaviour in so far they are linked in reciprocity with all other defined – may be or may be not - specialized domains, which are parts of the global mapping involved. So these specifications are not modules of behaviour; that is they don't form separate parts of a puzzle, which on the condition that they are well-linked with each other, all of them together call up a specific picture of behaviour.")

Of great importance in the theory HBF are global mappings formed by learning those uncountable functions of posture and movement, which we execute automatically every day, such as walking, balancing, stooping, seizing, touching, cycling and so on. After the learning process the whole pattern of behaviour has been fixed in these mappings.

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The tuning of all kinetic function-aspects to each other has been established, at the same time complying with and corresponding to the important environment aspects to be perceived, so that the relation between body and environment as it were can be a symbiotic entirety. With this the perception is no longer analysing (so not this here and that there) and certainly not conscious. That which is perceived in a flash is not so much the structure of the environment itself, but the posture of the body corresponding to that environment.

In his latest book ("A universe of consciousness , page 186 -sqg) Edelman emphasizes that the mappings concerned, after a consciously guided learning process, no longer participate in the complex corticothalamic clusters, which are the base of conscious experiences. They are attached in the nuclei of the midbrain and the cerebellum in such a way that they can be activated from there. The consequence is that they are insulated from the level of consciousness. Therefore those routine actions can be entirely unconsciously executed as soon as they are called up from a conscious intention.

In "Neurowetenschappen, een overzicht" ("Neurosciences, a survey") written by B. van Cranenburgh, 1997, that same insulation is discussed. On page 153 we read: "With the adult

human the palaeolevel (especially the basal ganglia: page 93) plays an important role in routine actions: complex behaviour patterns which can be executed absent-mindedly". On page 168 (also earlier on page 93 and 96) he speaks about 'pattern generators' in the basal ganglia for complex automated actions. Especially about the (many nuclei containing) striatum he says on page 272: "The projection of the human body in the primary motor cortex is to some extent to be found here. So the cortical organisation doesn't get lost in the striatum." And as regards the kinetic tuning at those routine actions he remarks (page 168): "In the lowest (spinal) level all kinds of frequently used 'links' are ready: co-ordinative structures".

Edelman writes about this ("A universe of consciousness", page 188): "The resulting functional insulation would be ideal for optimising the neural interactions within such circuits while reducing those with the rest of the brain."

With a persistent eccentric positionality that functional insulation is impaired and with it the attained 'optimisation' disappears. Then there is as it were 'broken in' into these complicated meshworks, consequently the authentic perception is disturbed (because of the fact that there is paid attention to the wrong signals) and as a consequence of that the musculoskeletal system is wrongly used kinetically, while in the mean time (many times unconsciously) the insecurity keeps the stress apparatus in a state of alarm. In this way polymorphic somatic disorganisations develop fairy-rings which strengthen one another every time and again. Elements of these disorganisations are: dysfunctional muscular tension, dysfunctional position of skeletal segments, anomalies of tissues, autonomic reactions to it, disturbed cerebral meshworks, hormonal deregulation (with which a disturbed endorphin-regulation may be of importance) . These effects of somatic disorganisation are functionally very drastic, but as for structure normally too small-scaled to be observed by the medical diagnostics by way of the usual apparatus or chemical analysis. In nosological terms there is 'nothing to be found' and often follows, for want of anything better, the diagnosis 'psychosomatic complaint' with all the dualistic interpretations linked to it.

By reactions from the tissues and skeletal segments on tactile communication-forms the therapist HBF has learned how to observe those effects of a persistent eccentric positionality.

It may be clear, that the therapy in the first place should be focused on that eccentric positionality and thus on the repairs of the possibility to function again in a centric positionality.

4. Research into biomechanical principles

Also the manner in which the subject uses biomechanical principles appears to have diagnostic value in relation to centric positionality as well as to eccentric positionality from where the behaviour of movement takes place. It's sufficient to state here that the written remarks about biomechanical principles are based on a built-up 'library' of elaborate researches via video-recordings, which by means of advanced techniques (such as speed reductions, combination of successive movements in one image) have been thoroughly analysed.

On the base of these analyses we discuss the following three items:

A. For every movement the point of support from where it is put into motion should be situated outside the body.

B. The organisation for the maintenance of poise plays an important role in it.

C. The principles mentioned in the sections A and B have substantial consequence for the therapy.

A. For every movement the point of support from where it is put into motion should be situated outside the body.

However, with patients who persistently function from an eccentric positionality, was discovered that the point from which they put the movement into motion was always situated inside the body. With the patient with an eccentric attitude the body part that was in interaction with its environment was 'steered' from a non-conscious rigid-kept part of the body.

This discovery gave us insight how important it was for a vital, adequate functionality of motion, that the point of support from which it was moved had to be situated outside the body and that at the same time one should consider that in upright position the starting-point for it was always situated under the ball of the big toe.

With vital actions deep-seated musculature of the back is drawn on by the take-off movements of the foot. This musculature of the back takes care of the unilateral contractions such as the lateroflexion and rotations, the function of stretching and the stabilisation of separate movement segments of the spinal column. Owing to the deterioration of the vital functionality an appeal is made to the muscles of trunk and shoulders, the trunk-upper arm muscles, the costal muscles of the spine and the superficial back muscles and many other muscles to steer the

posture. Through this the musculature regulating the 'turnabout' of the upper limbs served for maintaining the posture. If the chosen movement forms eventually resulted into non-self-

correcting positions of the movement segments of the spinal column or parts of it, a wrong, eccentrically-controlled movement pattern came into being.

So bone moulding, distortion of intervertebral discs and changed bone positions in the joints are not always the causes in a complaint-pattern, but rather the consequences of a wrongly regulated movement. Activities, social circumstances, traumas and ageing can bring about that the posture and movement are controlled from an eccentric positionality, this also is the case with a trauma, with which the control of the joint 'only' drops down.

B. The organisation for the maintenance of the poise should take place in accordance with the biomechanical principles.

The initial phase of the movement showed us the point of departure of the movement segments of the spinal column and provided us by this with information about the quality of the ability to function. When the movement segments of the spinal column could not make a turnabout movement from a stretched position the movement didn't work out optimally.

The optimal action in standing posture must be characterized by such an organisation of the body that an adequacy arises between the necessary vigour, rapidity and accuracy to deal with the object.

Well then, the gradation in how far one can maintain the poise is also a determining factor for those qualities of action, in orientation towards an environment object, evaluated by the individual.

In what way is this interaction between optimal movement and the maintenance of poise organised? The leg which realizes the take-off movement when throwing a ball takes care that the poise remains the same by positioning the general centre of gravity above the plane of support of the supporting leg. By frequently moving the general centre of gravity of the body on the hip-head of the supporting leg the poise is realized for the action with the manipulative arm and hand.

In case of deterioration of movement quality is attempted to stabilize the poise as much as possible above the supporting leg, by which the general centre of gravity of the body gets a more steady place. Through the fact that the accent for functional

actions is put on the maintenance of the poise there develops a reduction in the adequacy of the stretching of the spinal column for the realization of the turnabout movements. The body functions then as much as possible from a stable-kept poise.

Flowing movements are characterized by the fact that one unstable poise is changing over into another. In trying to keep the poise stable as long as possible, the movements become wooden, and are controlled from an eccentric positionality.

C. Consequences for the therapy

It may be clear that the cause of most complaints is thought of being a loss of quality: the patient can no longer function spontaneously, in no way.

It is a circular process in which a multitude of function-defining factors seize upon movement segments of inferior quality, which are fragile. Owing to that a (normally unconscious) watch-function arises which leads to all kinds of steered interventions on the entire patterns of posture and motion. These interventions evoke autonomic body reactions. There arises a fairy-ring of dysfunctional muscular tensions, wrongly charged joint structures and a

dysfunctional position of the vertebrae, as an inevitable, necessary adaptation to that steered posture and motion. The eccentric positionality which was already present or which developed owing to the above-mentioned causes, now gets clear attention as the maintaining source of complaints.

The adaptation-immobility is not directly dealt with symptomatically, it needs a total approach..

The therapy should not be limited to the correction of joints, but in the first place be directed to the re-instatement of a centric positionality in posture and motion and thus in such an intentional orientation towards the world that the functions of posture and motion are de-passed and can pass off as routine actions, in harmony with the biomechanical principles.

Centric positionality supposes that the individual can lose oneself in the communication with others and other situations. This always calls up an optimal breathing-movement and an optimal tension of the muscles as a condition for the realization of total communication.

As a rule the therapy starts with the use of the written principles mentioned in the subsections A and B, so that the patient

experiences how it feels to take off in the proper way, linked to the correct organisation of the balance of the body.

After that the therapy is a touching tactual therapy, which initially is directed to the spinal column. Not any of the usual forms of treatment in the physiotherapy and in the so-called 'manual therapy' are utilized. So vigorous and compulsory action is out of the question.

Repeatedly the vertebrae , one by one, are tactually appealed to so that with the lapse of time a spontaneous reaction arises in a play of light pressure (by the therapist) and a counter-pressure (by the vertebrae). This becomes a form of body-communication with the 'outside world'(in this case the therapist), in which there is no control from the patient himself / herself. The body itself puts the vertebrae in their functional position, in which the joint can realize its supporting power in the best way and in which the freedom of movement is optimal.

In this way the body acquires in communication the chance of reacting safely in centric positionality.

In order to make this form of communication-possibility permanent, it is sometimes useful to continue to utilize a similar communication-form on the tissues of the patient in a domain that for the patient hasn't any relation to earlier communication-forms in which reactions in eccentric positionality had become a rule. The calf often appears to be an ideal place for that.

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