



Spiraldynamik

The Art and Science of Human Movement Coordination

Are **you** the kind of person who understands and experiences **Life as Movement**?
Are you looking for ways to realize the body's potential - **professionally** and **personally**?

After ten years of interdisciplinary research, an anatomically-based model of human movement coordination, Spiraldynamik, has been developed, tested and shown to be highly effective.

Spiraldynamik clearly explains ordinary and specialized movement as a three-dimensional and dynamic process in time and space. As a result, it opens new perspectives in training and therapy.



Movement starts with shifting the center of gravity



Coordination - the perfectly harmonious interplay of bones, muscles and nerves directed by the brain



Dynamics - systematic description of human movement

Our work is dedicated to the newborn whose equilibrium and mobility embody the potential 'Upright Being'.

Definitions

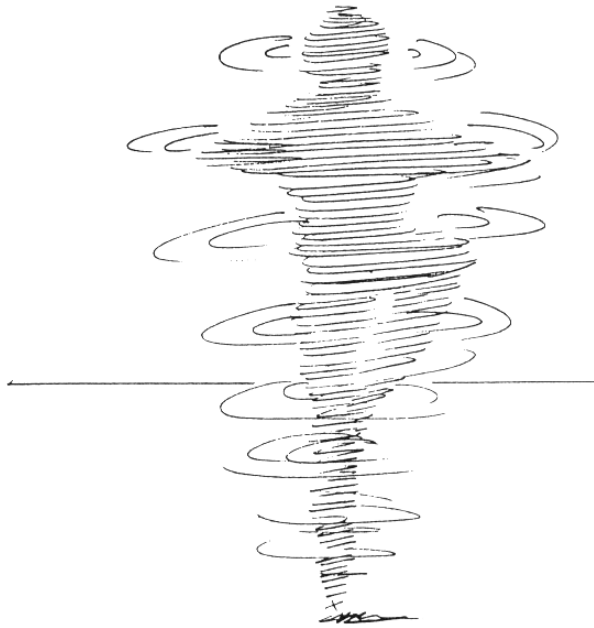
Coordination means the perfect interaction of all psycho-neurological and biomechanical functions of the body before, during and after movement. Experience has shown that maximum efficiency is obtained by combining bio-mechanical means (training a more precise body awareness) with psychological insight (developing internal images of movement).

Movement could be defined as shifting the center of gravity, either the whole body or one of its parts. Thus even simple movements, such as changing the bodyweight from one foot to the other, are seen as significant.

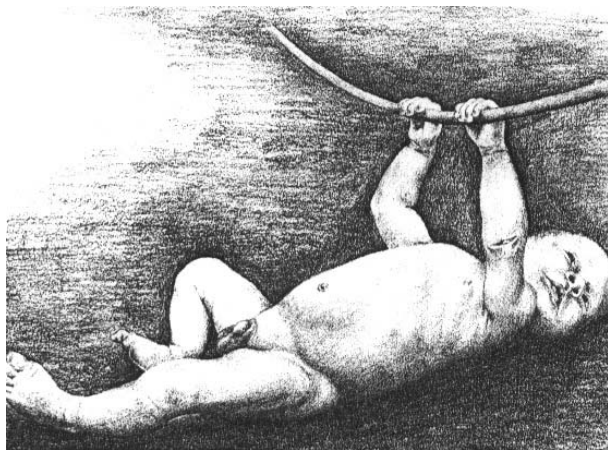
Spirals in this context represent the three-dimensional helix which is a basic structural and functional principle operating in the human body. Spirally formed bones, joints and muscle structures form the anatomic basis of our mobile abilities. The three-dimensional interlocking of these helical spirals results in harmonious and coordinated movements.

Dynamics, the systematic description of movement, includes the principles which govern the human body as a unit.

Seen this way, anatomy becomes the visible embodiment of unseen principles.



Spirals - three-dimensional and dynamic



Grasping reflex of a healthy newborn baby



Walking reflex of a healthy newborn baby

Life in the womb - movements ,without' gravity

The newborn baby is already able to perform essential movements such as grasping and walking. These archaic movements are neurologically coordinated by old structures of the brain, the result of a long evolutionary process. They can teach us something about the fundamental principles of human movement coordination, although they happen as reflexes and must be seen as neurologically ,immature'. It is amazing to experience the power and the effortlessness of a newborn baby's grasping reflex, the small hands holding on firmly to an adult's finger while the shoulders remain perfectly relaxed.

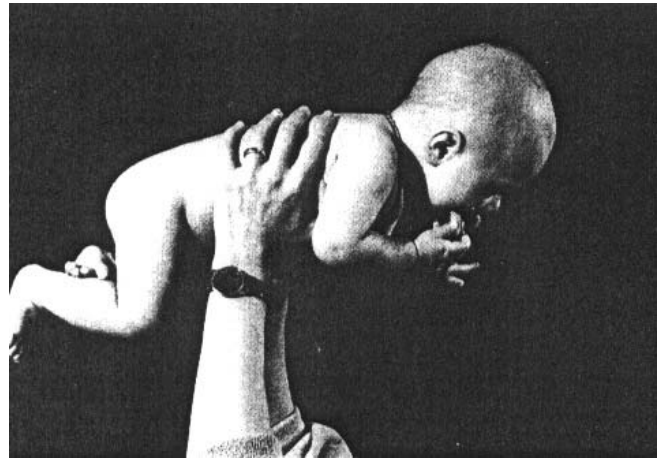
Three essential factors of movement-coordination are present in the newborn baby: balance, mobility and a simple set of highly efficient movements.

Before birth, human life develops in its original element, water. An amazing repertoire of complex movements and expressions is already available to the unborn baby: kicking its feet and waving its arms, grabbing, playing with the umbilical cord, making faces. These spontaneous movements happen undisturbed in the amniotic fluid, a medium almost devoid of gravity, and are determined by the inborn biomechanical synergy of bones, ligaments, muscles and the nervous system. During the first weeks after birth, this archaic coordination is maintained and can be easily observed.

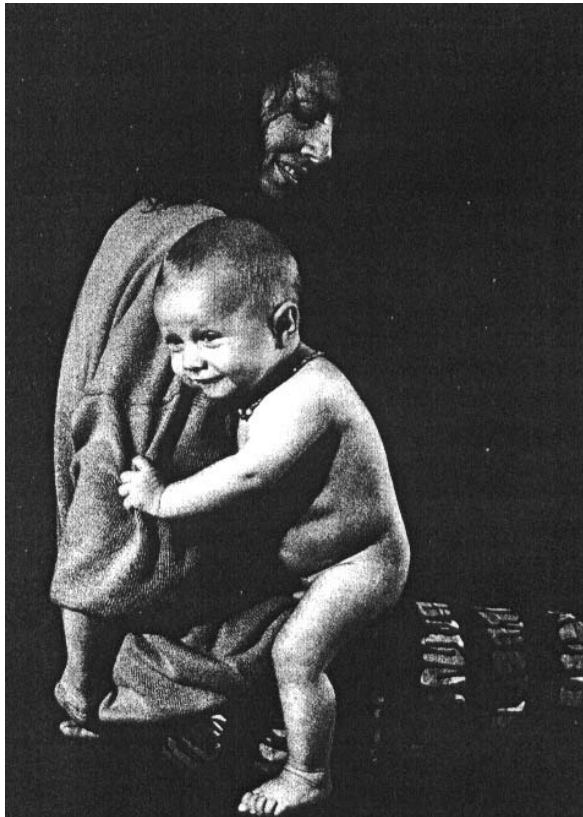
After birth, the lifelong struggle with gravity begins, and the original ease of movement fades. Imbalance and loss of mobility occur quite regularly. All movements must be relearned by the infant. However, bad habits are acquired patterns of behavior that can be ,unlearned' again. In fact, deep body consciousness clearly remembers the original ease with which these archaic movements were performed. This indicates that both children and adults are capable of changing their habits of movement.



Human life is developed through movement (NILSON)



How adults can learn from the newborn child

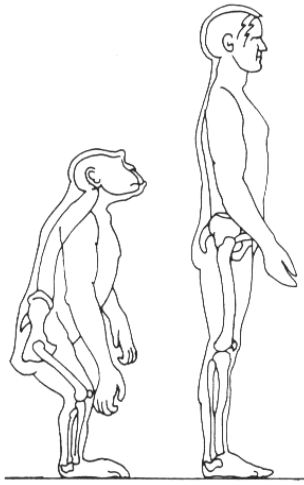


Gravity - risk of disintegration and challenge for uprightness

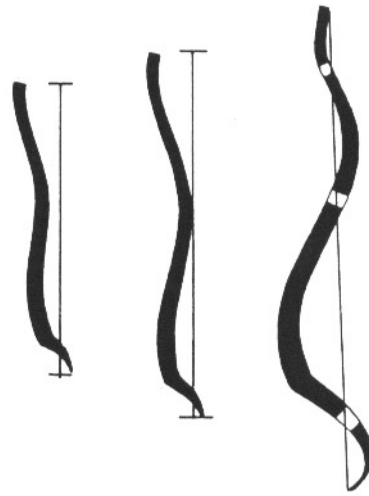
Homo erectus - evolutionary error or revolutionary masterpiece?

Our body is the result of an evolutionary process which has not yet been completed. An essential aspect of this process involves raising the pelvis, our center, from a 'horizontal' to an upright position.

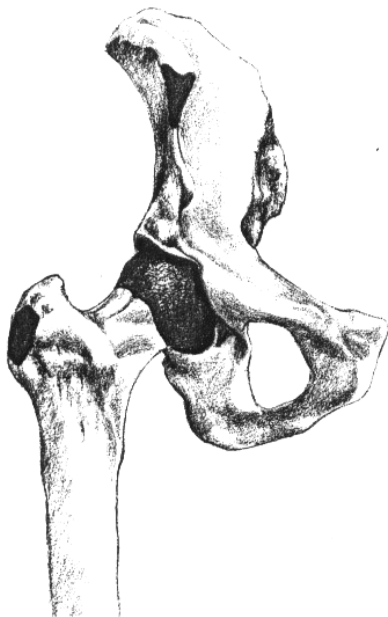
Current concepts in human bio-statics are not encouraging. The average pelvis is tilted forward approximately 60°. Therefore, the sacrum forms an inclined plane, a sloping foundation for the spinal column. However, this construction seems to contradict all bio-architectural logic. Because of the angle of the pelvis, the spinal column often develops into a crooked rather than an upright form. The spinal column of the newborn is gently curved and relatively straight whereas children and adults progressively develop an S-shaped spine. This happens under the influence of gravity as soon as children start to sit and stand.



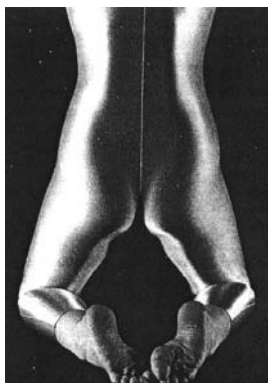
Human uprightness is an evolutionary process



The progressive curving of the spinal column in infants, children and adults is due to gravity (modified according to W. Kahle, PAA, Thieme)



*Assuming the oblivious: bringing the center to an upright position...
...in comparison to the forward tilted pelvis (indication 60%)*

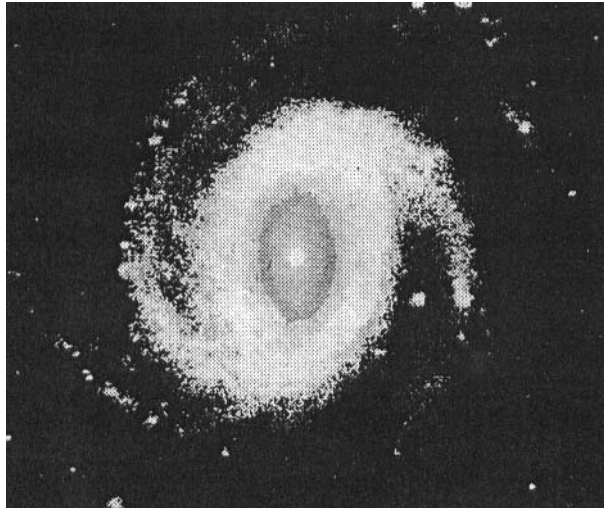


The average shape of the human spine reflects the enormous difficulties for human beings to be truly 'upright', both physically and inwardly. The development of a curved spine indicates a fundamental problem in coping with gravity rather than offering an insight into the structural principles of the human body. The frequency and extent of back problems makes this more than evident.

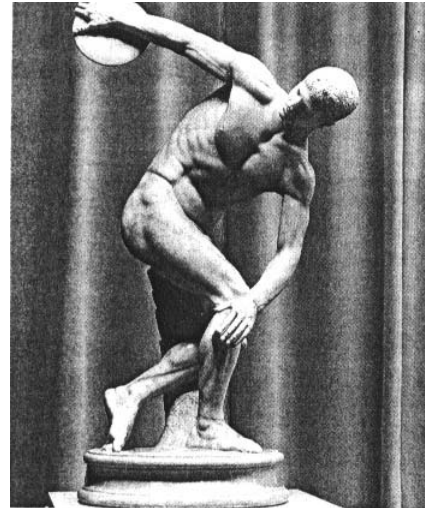
The pelvis in a upright position combined with an undulating and upright spinal column obviously opens up new perspectives: the human body is not an evolutionary mistake, but is already designed for the future. This assumption can be traced down to minute anatomical details. The spiraldynamic model implies a new, (r)evolutionary concept of 'Homo Erectus' - an 'Upright Human Being' that truly deserves this title.

Raising the pelvis – aligning the spinal column.

Does human anatomy reflect universal principles of movement?



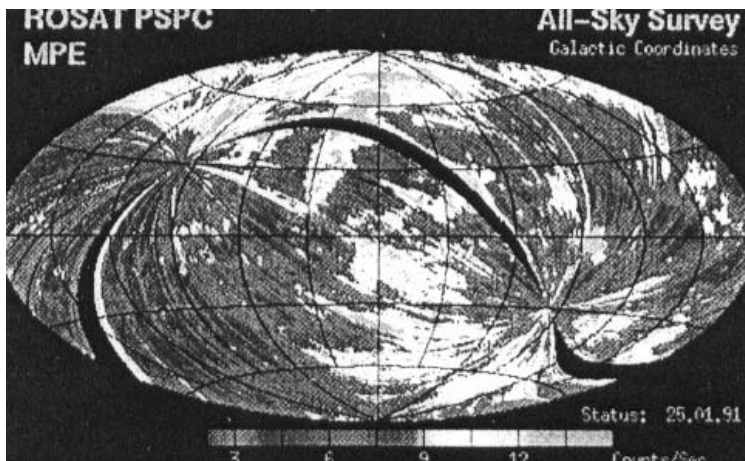
Spirals and waves - universal patterns of movement (CARA)



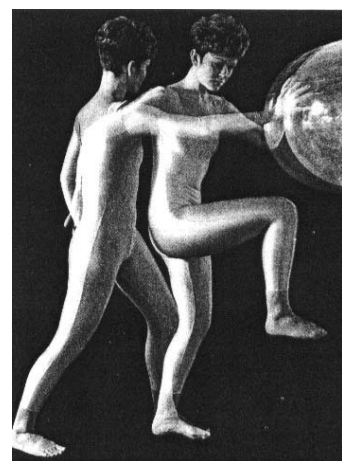
Dyscolobol of MYRON - (BRUCKMANN, München)

Natural science shows us the basic principles upon which matter and energy are organized. Classic examples are **spirals** and **waves**. Spiral galaxies, the growth patterns of plants, whirlpools and whirlwinds are all based on spiral movements. Light and sound, water and sanddunes travel as waves.

Bi-polarity is another universal principle manifest in atoms, magnetic fields, electricity and symmetry (crystals, isomery, DNA-double-helix). Magnetic fields (north/south pole), electrical fields (anode/cathode) and cloud-formations (cyclone/anticyclone) share one characteristic: the movements of the particles between the poles are determined by how the poles move. Field lines and cloud patterns make these bi-polar and symmetrical phenomena visible.

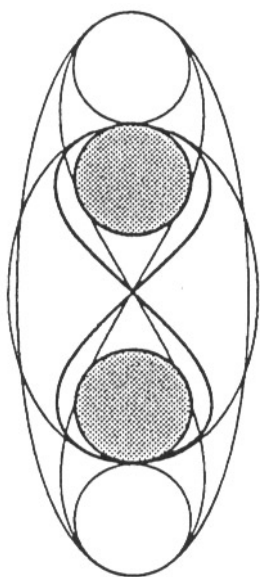


Galactic coordination: bi-polar symmetry (MPI, Garching J.Trümper)

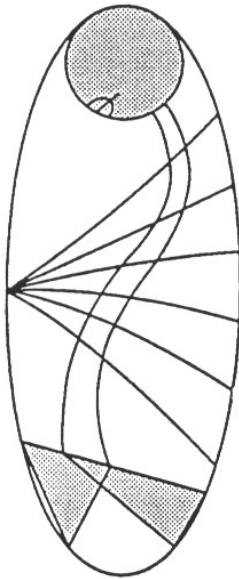


Spiral movement of the spine

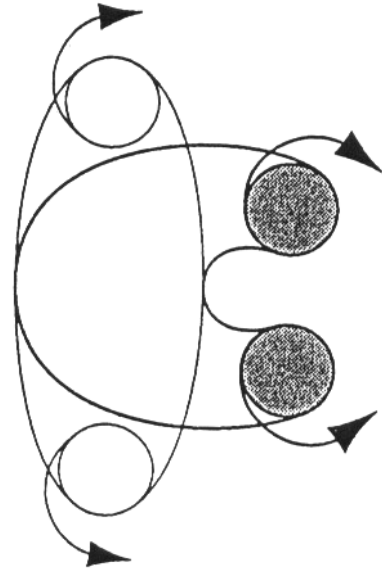
This raises the question as to whether human anatomy reflects these universal principles. In fact, these principles of movement are to be found throughout the body, for ex-ample in the torso and the foot. Coordination is achieved through specific symmetrical movement of the poles involved. Certain muscles take on a leading function. The same basic principles are also reflected in the structure of bones and the arrangement of ligaments.



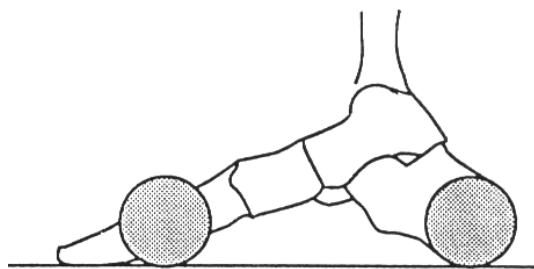
Axial symmetry as a model



Axial symmetry in the foot



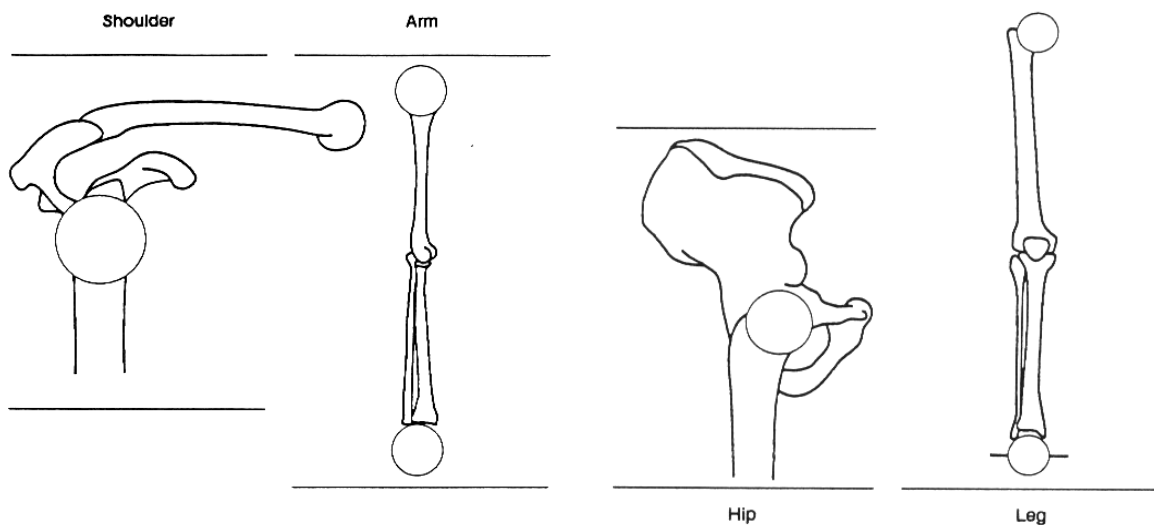
Mirror symmetry as a mode



Axial symmetry in the foot

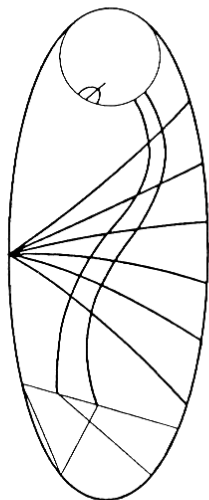
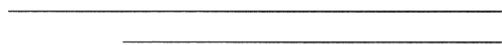
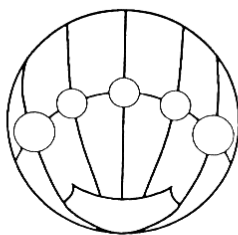
One basic movement, curling or rolling up, is characterized by a symmetrical rotation of the poles (*mirror symmetry*). It is found in the torso as symmetrical rolling movements of head and pelvis, in the grasping hand as symmetrical opposition of thumb and fingers, and in the forefoot as a shock-absorbing mechanism. Another basic principle involves spiral movements (*axial symmetry*). It can be found in the evenly-distributed torsional motion of the torso, the arch of the foot, and in rotation during the bending and extending movements of our limbs.

Movement coordination: the poles know how to turn...



Seven interrelated units of movement can be identified in the human body: the torso as central unit, the shoulders and hips as transmitting units, the arms and legs with a connecting function, and the hands and feet as

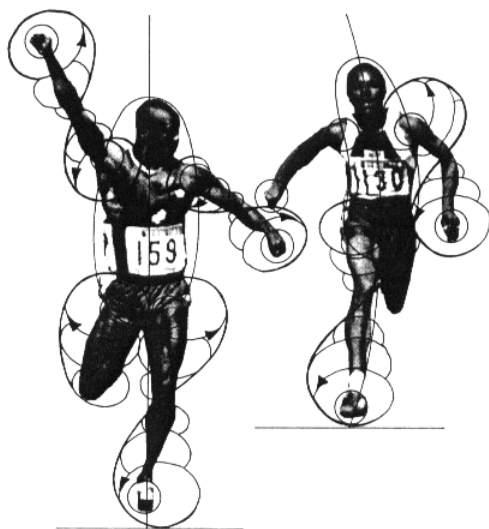
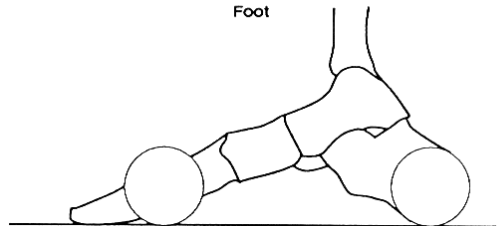
Hand



Torso... ...central unit of movement



Foot



centimeters, kilograms or seconds. Agility, balance,

Coordination as a parameter for performance and health

autonomous units at the periphery. Each unit is anatomically defined by its spherical poles.

Coordination of Movement in Sport

Health *or* Performance?

More than ever, sport is in the area of conflict between health and performance. There are specific differences between the categories of mass sport, competitive sport and sport therapy, and it is of fundamental interest to examine these differences:

In **sport therapy** the desired level of performance necessarily depends on the individual's condition. Health is the goal, sportive performance the therapeutic means.

Mass sport increases the individual's wellness and fitness and is, therefore, a significant contribution to public health, especially with regard to heart and lung problems. A certain amount of accidents and chronic damage to the bones, ligaments and muscles, however, reduces the positive synergies between sport and health.

In **competitive sport** only those who are in excellent physical and mental shape will be able to give a top performance. Maximum performance is the goal, sportive health the means. In the negative case, an individual's performance takes its toll on their health. Things become even more imbalanced if the desired result cannot be attained in spite of substantial health risks or sacrifices. The long list of acute sport injuries and chronic damage to bones, joints, ligaments and muscles bears testimony to this.

Health *and* Performance

The decisive question is, "How can health and performance be made to complement rather than compete with each other, especially in top competitive sport?" Technique and training need to be considered first.

Both technique and training aim at the best possible coordination of the sequence of movements. Good technique helps avoid straining due to misplaced loads. Well-structured training helps avoid straining due to excessively intense or long exertion. Furthermore, one's personal performance limits need to be realistically assessed.

Coordination of movement - this term summarizes the qualities of efficient and harmonic sequences of movement. We distinguish between quantitative and qualitative parameters. Strength, stamina, speed and acceleration are quantitative parameters. They can be measured in centimeters, kilograms or seconds. Agility, balance, timing and coordination are qualitative parameters and cannot usually be measured, or only indirectly. For example, we speak of a natural, relaxed, organic style of running without being able to define these qualities in a scientific and comprehensive manner.



Movement coordination - interrelated spiral movements throughout the entire body

Spiraldynamik as a model provides specific and comprehensive information about how all the poles move in time and space. Almost all basic movements in humans are forward-oriented. The orientation of the poles is thus pre-determined in one dimension. If this orientation is reversed, a loss of efficiency, balance and aesthetic expression inevitably occurs.

A practical example would be the dynamics involved in throwing a ball. Ideally, the torso winds up three-dimensionally like a spiral spring. Chest and shoulders remain integrated between the poles of head and pelvis in order to forcefully and efficiently transmit kinetic energy from the torso to the arm. As the movement flows through the muscular power center of each unit, kinetic energy increases significantly and creates a powerful and thus elegant flow of movement.

However, if there is insufficient coordination of head and pelvis, the movement cannot flow if resulting in a loss of kinetic energy. Muscular power needs to be regenerated in both shoulder and arm. Not only is there a decrease of efficiency, but an increase in the risk of injury.

Coordination of Movement in Training

Strength, stamina, speed and agility have to be trained with varying intensity. Standardized pro-grams allow an objective assessment of performance. Coordination of movement, however, is much harder to train and assess. The biomechanical orchestration of our bones, ligaments and muscles, their delicately balanced interaction, is a key factor for the increase of muscular efficiency. Therefore, the phenomenon of coordination of movement is currently the object of intensive scientific research.

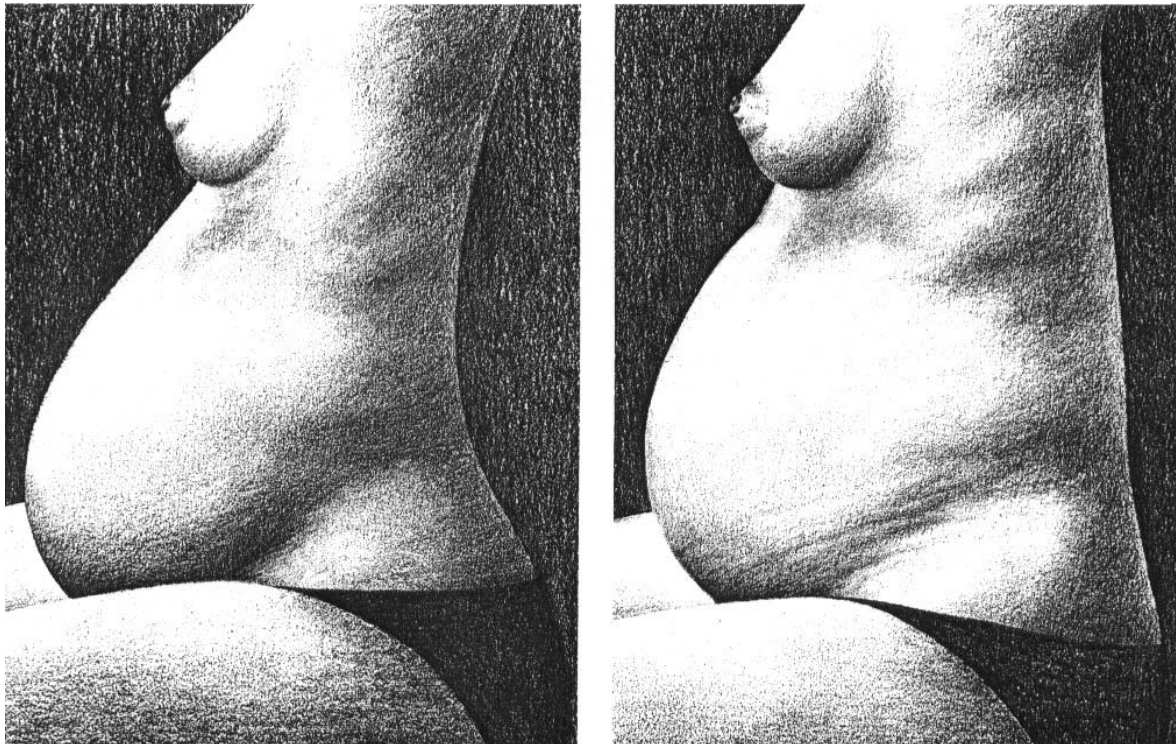
One popular example is **video** stereo recordings. One of the problems of gathering data is the three-dimensionality of the body, especially changing axial rotations of different body-parts. Based on synchronized images a computer produces three-dimensional sequences of movement to determine the angles and accelerations of individual joints. Adding comparisons between successful and less successful athletes can draw conclusions. The art of interpretation, however, lies in drawing the right conclusions for individual training. It becomes obvious that there is a lack of anatomically sound **dynamic models**, which allow explaining the dynamic human body as a functional unit.

This is exactly where the new and innovative mode of coordination, *Spiraldynamik*, comes in. It is the result of ten years of research and cooperation with physicians, physiotherapists, athletes and dancers. The functional

anatomy of the human body is the starting point. The model is based on fundamental principles of movement, which are expressed in the anatomy of the human bones, ligaments and muscles. The skeleton and its inherent osteodynamism are especially important. The specific symmetrical reaction of the poles (such as the head and pelvis during torsions of the trunk), reference points in the bones and centers of impulse in the muscles form an **efficient array of instruments for practical use**. The model opens new perspectives for training and therapy. The functioning of the human body as a three-dimensional dynamic unit of movement can now be appreciated.

Let us mention a few areas of application:

- Enhanced knowledge about the constant regularity of human movement coordination allows **basic techniques** to be simplified. Acquired pat-terns of coordination can be combined or transfer-red in a modular way, especially in sport with its multidisciplinary nature.
- Economical sequences of movement make for **improved performance**. Total muscle output is distributed to the greatest possible number of muscles. Maximum forces can be exerted by a coordinated activation of all the muscles with optimal leverage and vectors. The model offers new approaches, which have not so far been used effectively.
- Avoidance of acute and chronical misplacement of loads greatly lessens any risk **of injuries** and chronic damage.
- Early identification of individual strengths and weaknesses encourages efficient **training**. Here, the model offers points of reference based on experience. The current and desired statuses can be identified quickly and easily, so that efficient measures can be deduced.
- **Sport therapy:** physiotherapy increasingly relies on the model, giving new impulses in turn: the meaningful combination of therapy and training suggests itself.
- **Public health:** If people are enabled to in-dependently apply the simple and fundamental biomechanical principles in their everyday lives and in mass sport, this will undoubtedly benefit public health.
- **Sport ethics:** Changing sport ethics demands that coordination of movement should be accorded greater importance in sport. The aim is at *performance and health*» rather than *performance at the cost of health*». Athletes and trainers alike can now take advantage of this new model of human movement coordination.



*If the pelvis is tilted (hollow back posture) Ute unborn Child is „spilled out front“
...rather than being „carried under Ute heart“*

Physical balance during pregnancy and childbirth

Pregnancy, childbirth and the subsequent weeks are extraordinary experiences in a woman's life and in that of her family. Those weeks and months are a particular challenge to the adaptability of the human organism. Coordination of posture and movement are crucial here.

Pregnancy: Due to the growing stomach, especially during the later stages of pregnancy, static weights shift considerably. As the stomach pulls forward, the lumbar column has to carry excessive weight, resulting in often painfully tense muscles in the lumbar region. Due to the forward tilt of the pelvis the unborn child is „spilled out front“, so to speak, rather than being „carried under the heart“. This is why it is so important for every mother-to-be to find a new balance within her own body. Conscious relaxation of the lumbar and back muscles, active stimulation of the muscles at the pelvic floor, correct everyday posture and free breathing are especially important. The mode of *Spiraldynamik* is a sound, proven basis for body-oriented preparation for childbirth. Reference points in the bones and centers of impulse in the muscles serve to increase the pregnant woman's specific awareness of her muscles at the pelvic floor, the diaphragm and the floor of the mouth.

Childbirth: In the first stage of labour it is very important that the woman should be free to move. Instinctual movements and positional reflexes have a relaxing effect on muscle spasms, easing the child's descent into the pelvis. Free breathing throughout the birthing process makes sure that both mother and child have sufficient oxygen. In the final stage of labour, the expulsion, particular attention should be given to the various types of breathing and vocalization (such as moaning). The woman's body posture (e.g., fixation of the shoulders), an efficient way of pushing, the degree of relaxation of the muscles at the pelvic floor as well as the orchestration of breathing and voice all influence childbirth and can be influenced in their turn.

Retraction, the weeks after childbirth: Practical hints help the mother understand the dynamics of the pelvic floor.

Newborn infants: The mode of *Spiraldynamik* is based on the study of the primitive reflexes and spontaneous movements of newborn babies. It helps parents and other people who care for the baby to better identify and appreciate the baby's characteristic movements.



Spiraldynamik - Movement and Dance Ursula Stricker, Dancer, Berne/New York

Spiraldynamik is one possible approach to our own body, Ute instrument of movement. It is a journey towards the nearest, closest element of nature from which, however. Many, civilized' people have grown estranged and remote. Spiraldynamik is a series of steps towards a person who is upright and aware of their own body. It is a road into the depths, entering the world of our bones, joints and muscles. It is a quest, a search, and an exploration of those regions of our body, which may never have been truly inhabited. It is a journey through our body's geographical points and centers. A journey from tip to toe, from the sacrum to the shoulder-blades, from our fingertips to the breastbone - and on to the hipbones - to the base of our cranium - and back another way.

...a journey of discovery through our own body.

Conscious in-depth work with our body's spiral dynamical organization results in ever increasing and more clearly defined connections. Individual body-zones come alive and begin to communicate with each other, the laws and techniques of *Spiraldynamik* gradually fusing them, helping them grow into an alert, three-dimensional whole, a true body - for not only do the connections, points of reference and centers of impulses grow more definite: most of all, *Spiraldynamik* creates a *space* in our body, enabling US to experience

its volume. At last we move our three-dimensional body in a three-dimensional world. New experiences, sensations and discoveries become possible through our body. The coordination of movements improves; we are more alert within our body; energies are released and spaces are opened for a sensitive experience of our own creativity.

The *Spiraldynamik* process does not only supply a clearly defined, "technique" which takes into account everyday movements, but also a variety of starting points for creative expression in almost any field of expression and representation. Be it movement, dance, making music, working clay, drawing, painting, writing, ... In movement, for example, an imaginary „internal figure of eight" can grow into a visible figure-of-eight movement of the pelvis; In a further step this figure-of-eight movement of the pelvis can be extended into space. In improvisation, it becomes possible to clearly initiate a movement from individual Parts of the body and impulse centers. The quality of movement is improved by better balance and enhanced coordination of the bone and muscle Structure that is, the application of the laws of *Spiraldynamik*. Movement becomes whole, organic, beautiful, dear, strong, flowing and free – *Spiraldynamik* is the starting point for free human expression.

Dance is unique because the dancer's own body is used for self-expression - be it **as an art form**, for self-exploration, as a means of expression, as therapy, or as a (culturally accepted) form of social behavior. It is based on the classical, modern or personal movements and positions of the human body. The dancer's intentions may be of a professional, emotional or artistic nature or due to health reasons and take them into their respective settings: the stage, the dance-hall, the ballet or therapy Studio.

Regardless of the difference in **motivation** and intention, the instrument is still the human body which, while serving the purpose of dance, remains a source of individual experience. **Technique** is required to use this instrument - be it for a specific style of dancing or for personal expression.

Individual motivation determines whether a person's ability and technique remain elementary or are honed to precision. Technique as a Part of the professional dancer's curriculum provides clarity and security and enables the dancer to identify, grasp and reproduce sequences of movement rapidly. It is not technique as such which is problematic but how it is taught. Any technique must be understood before it can be applied. This aspect must be handled with the greatest care in a dancer's training, where technique is especially important. It often happens that - correct placement being the predominant aim - technically attainable ideals determine the entire training process; what is best for the individual body is not sufficiently taken into account. Less talented dance students with ungainly **patterns of movement and coordination** have difficulties to use technique as a counterbalance to those patterns. Technique should protect the dancer and be a tool for self-expression, neither restricting nor hurting them. This concept of technique demands from both teacher and student the ability to not only see the external image of the dance but also to recognize and experience the individuality of the human body during the dance movements. For the dancer, technique means understanding; it makes demands on their perception and self-responsibility; it helps them to experience exercises with greater consciousness and a greater sense of purpose. Good coordination of movement is the best way of avoiding risks brought about by stylistic and technical daring. It greatly reduces the risk of injuries and chronic straining.

Typical examples of uncoordinated work - the so-called, 'décoordination professionnelle' - are excessively tense buttocks, extremely straight and hyperextended knees, pulled-up kneecaps, excessively tightened shoulder-blades and lifted chest bone. Classical ballet often requires a forced turn-out of the feet although physically this is not yet or not at all possible. In children, a 180-degree turnout can have devastating effects. The immediate influence of the position of the pelvis on the hip joints is not sufficiently known; the muscles at the pelvic floor are rarely perceived as a center of important impulses.

Ignorance about the coordination of the entire body - of the laws of equilibrium, economy of movement and flexibility - inevitably leads to undesirable contractions of certain muscles and to an unevenly distributed weight on the joints, thus impeding the coordinated flow of movement. Flowing movement is esthetic expressivity, inner and exterior perfection in dance.

Professional dancers who train and dance daily depend on anatomically and functionally correct training in order to exercise their profession successfully and without physical injury. Amateur dancers and students should be able to put to everyday use what they have learned and experienced through dancing. Only instructions based on in-depth knowledge and understanding of body-structure and the function of movement can help to develop and improve coordination of movement - the artist's, the dancer-acrobat's, or of those who dance for health.

The teachings of *Spiraldynamik* show regularities and laws reflected in any movement. The dynamic sequences of movement and static positions can be analyzed precisely and simply because it has been found that the flow of movement is coordinated by the poles and muscular impulse centers of the body. , corrections'

therefore become valuable approaches to individual progress.

Dance training not only consists of technical exercises, but also of the development of a sensorium for movement, self perception and the creative expression of internal (dance) images. Various approaches to dance teaching emphasize these latter aspects during any given lesson. Technique must be integrated into a larger concept with exercises being either secondary or not done in isolation. The knowledge about the spiral dynamical organization of the human body helps to develop approaches to movement, which are adapted to all levels. Improvisation tasks, for example, can be set according to the, **anatomy of movement**', to enable complementing Personal experience of movement and a striving for technical perfection. The result is an experience of merged perception and expression, clear-cut forms and an organic flow.

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