

## Theory of training in handball – between claim and reality

*Despite the numerous efforts in the context of sports science and sports practice, there is no specialized theory of handball training as yet. In a variety of issues, handball trainers are many times on their own, “borrowing” temporary solutions from other sports, which are neither particularly representative of the specificities of the sport, nor can they cover them in their entirety. The aim of this contribution is to provide a new theoretical basis, as well as some interesting perspectives on dealing with the challenges present in modern handball. This theory can be used as a “tool” of self-evaluation, through which every trainer is prompt to assess their own play and practice forms, to change them systematically and to develop some new and improved forms.*

### In the tension field of wish and reality

In modern handball, players and trainers alike are confronted with increasingly higher demands. Today, a handball trainer is expected to be:

- An expert in condition training, technology and tactics;
- A specialist in analysing the play of the opponent perfectly,
- An expert for the tactical setting on the opponent,
- Able to prove his coaching qualities in the competition,
- Always at the latest state of development,
- An expert in talent scouting and support and
- Still able to deliver solid managerial qualities.

But who of us can claim to be able to fulfil all these requirements? It is often the case that a variety of problems arise from the basic duties of a trainer alone. As Andresen comments on the topic of systematically planned youth training, “A good trainer is the one who always reflects on his behaviour in order to discover his mistakes and correct them, and the one who possesses excellent knowledge, which he permanently keeps up to date”. These are the same expectations that trainers have of their players. Below, a few good examples are provided:

### How well do we understand handball tactics?

Handball is a tactical sport and the trainers should have enough know-how over play concepts in attack and different defensive formations. But there is often not enough basic, “pretactical” or “protactical” knowledge, and by this we mean the elementary rules of conduct in time and space within 1 against 1-, 2 against 2- and 3 against 3-situations in a general form, as it is also observed in other sports (e.g., football, basketball and hockey).

### How much do we know about learning processes?

Techniques are taught mostly in simplistic (learning) situations through frequent repetition and detached from play situations. As it is not necessary to adapt these techniques to play situations, the learning process becomes an end in itself.

Many coaches do not wish to be involved in the process of learning but prefer to point out the missing qualities in a player. Therefore, they ask the managers for “ready” players, who have no additional learning requirements.

### How much do we know about fitness training specific for handball?

In spite of the works on conditioning training (e.g. SICHELSCHMIDT/KLEIN 1986 and 1987, as well as KLEIN/SICHELSCHMIDT 1987), agility training (e.g. NEUMAIER/KLEIN in 1991 and KLEIN/PLUMHOFF/SCHIFFMANN in 1991 as well as FELDMANN/SPÄTE in 1998) and gymnastics (e.g. REINERT/SPÄTE in 1992, LUDWIG/PIEPER/PÜHLER 1992 and LEYDER/DIETZE 1992) training practise is still very resistant to innovations in these areas.



Often the fitness training is still carried out based on the maxim "a lot helps a lot". New forms of the gymnastics are accumulated slowly, and in the case of youth training, the players are often on their own.

### **Are we not too often in search of "prescriptions"?**

Handball coaches are trained and educated further annually, and a strong wish for practise demonstrations needs to be recognised. The intention that often lies behind this is to take what is demonstrated and bring it directly into their training, nevertheless, without achieving the transfer to the associated conditions. Not every trainer will be equally affected.

Further implementations will reveal a significant discrepancy between the general solutions/instructions of the science of training on one hand, and the specific problems of handball trainers on the other. In the literature of training, a construct of ideas with no directly visible effects is summarised under the title, "Theory of training".

Being a coach does not only imply a plurality in the knowledge of exercises, but more importantly, it involves the knowledge of which practise must be applied and for which purpose, which demand forms it is connected to and how this practise will then work.

It is about the underlying perceptions, doctrines and dogmas of the theory of training. These concealed structures are to be recognised in the tables of contents of many training-scientific textbooks specific to handball. The composition of such books (e.g. HARRE in 1970, but also MARTIN (Red)./CARL/LEHNERTZ 1991 and in the handball TROSSE in 1990) is almost identical and focuses on the following points:

- introduction of the training principles,
- representation of the pattern of supercompensation after strain,
- description of the strain through the various stimuli,
- description of the conditional abilities (mostly purely biologically derived),
- description of the motor learning process following the control circuit principle,
- representation of the means and methods of the training of technique (of the acquisition of athletic movement skills),
- Organizational recommendations for the training construction (structure of training) in accordance with the traditional periodization concepts (supported by SELYE's adaptation syndrome under stress) in ripples (TSCHIENE 1988, 8).

MATWEJEW (1972) and HARRE (1970) are the main representatives of this position. They have provided numerous coaches with instructions on how to deal with the practise and training processes. Some inconsistencies pertaining to the practise of sports were covered by the modification of the existing instruments: for example, some practitioner developed the unimodal periodization based on MATWEJEW (1972), to a two-fold or three-fold periodisation (MARTIN (Red)./CARL/LEHNERTZ 1991, 251following). However, it is questionable whether further development of the theory of training was thus guaranteed.

The background and the theoretical basis of this "ruling" theory of training is our mechanical understanding of science, which is also reflected in the theory of training. We are used to splitting complex phenomena in smaller, clearer unities, applying certain methods for optimisation and afterwards putting everything back together again. Even the motor activities of the biosystem of the man are broken down in various partial complexes and analysed from the point of view of biomechanics, biochemistry, physiology and psychology. The biomechanical findings confirm that the technical training, the biochemical basis form the basis of conditioning training and psychological preparation of the athletes is also treated in isolation.



A result of this mechanical image of man is a huge number of empirically analytical information that becomes available to the coaches and scientists. While the implementation of this flood of information is still possible in the majority of the conditioning defined individual sports (athletics, swimming), e.g., through the contribution of several coaches, team sports present practitioners with almost insolvable problems due to their complicated demands. The combination of the load-steering components extent and intensity alone, as well as the three parameters of action: tactics, technology and condition seem impossible for a group of sportsmen with different prerequisites. In the field of team sports, such as handball, three main problems can be formulated in relation to the prevailing theory of training:

Due to the complexity of the game, tactical, technical and conditional components appear during training as well as in the game, influence each other and cannot be separated from each other. Therefore, an isolated optimization during the training practise is also not possible.

The load cannot be optimally controlled without the individualisation of the training process. Handball teams are comprised by sportsmen with individually needs and different conditions (anthropometric and physiological parameters, but also different rhythm of adaptation, etc).

The competition practise reveals that renunciation of classical training is necessary, as the duration of the single phases is no longer compatible with their function; a competition season in handball lasts approx. eight months, out of which the preparatory period is reduced to two months, or in most cases even less (due to vacation and closed halls).

The aforementioned problems here reveal that

- a re-orientation in the theory of training is necessary,
- an approach restricted to an exclusively empiric-analytic base cannot answer to the complexity of the conditions, and
- a new approach must be applied to tackle all the questions relevant to the sport.

### **A (not so) new approach to the theory of the training**

In his 1987 work "The targeted development of sportsmen mobility", Russian training scientist BOIKO, introduces a new theory of training. Further down, we will be dealing with some aspects of this theory. His terminology is new and takes some getting used to: "When one completes any kind of movement activity – be it during training or during the game – we are not dealing with single muscles, inner organs, or biochemical reactions, but rather with an integral living organism, which – from this aspect – presents his motor expressions as a functional system of movement" (BOIKO 1987, 7).

The 'theory of the functional systems' goes back to the Soviet physiologist P.K. ANOCHIN. We are dealing with a comprehensive perception of the sportsman and his complex interaction with his environment. The image of the organism as a functional movement system is closely related to the „principle of adequate reflectance“; the striving of the organism to adapt to the demands put on it is called homeostasis: The organism tries to adapt to environmental stimuli including the demands during a game or training–. This process is a system-building factor. The reflection of movement activity is highly specific in all functions of the organism musculus formation, morphological structures, and neural supply. In biology, adequate reflectance finds its embodiment in the concept of "adaptation". It is clear that the organism cannot react to all environmental stimuli at the same time.

On one hand, a certain stimuli frequency and stimuli density is important, though a singular load stimuli (for example, a one-time cross-country run of one hour) will load the organism, but will not, however, induce it to adaptation (e.g., improved capillarisation in the claimed musculature). On the other hand, it must be understood that the adaptation capacity of the organism is not boundless. BOIKO assumes a limited energy potential for structural alteration works in the body. „Particularly



during strenuous movement activity (primarily connected to sports training) a competition in the organism regarding the material-energetic adaptive reserves takes place. ... Hence, the organism is not able to guarantee the simultaneous development of multiple activities, skills, and conditional abilities up to a high level. From this we conclude that, achieving a high degree of perfection of motor function requires a predominant concentration of this reserve at quite specific and mainly specialized movements, especially taking into account the relative narrowness of the adaptation reserve of the organism ...“ (a.a.O., 42following) .

Thus, this modern adaptation reserve (AAR) represents an important performance-limiting factor of the sporting movement activity of highly specialized functional movement systems. BOIKO illustrates this in his radical statements about the ratio of general to specific stress load: General training means or general conditioning exercises should not monopolise a high part of the adaptation capacities of the organism. In the highest achievement steps all adaptation reserves must be used for the development of the functional movement system specific to sport, if not for “a decrease in the intensity of the performance and the attainable maximum of results of what is potentially possibly for the athlete” (a.a.O., 64). At the same time, the importance of the competition activity (BOIKO names it "aim practise") in the movement activity during training, becomes clear. Optimum training effects are to be expected only if, during training, the concrete parameters of the competition activity are copied. Just as the training stimuli find their adequate reflection in the adaptive responses of the organism, in the same way, the specific requirements of the competition should be simulated in training. Out of the fact that every organism interacts with its environment in the dimensions of space, time and energy, BOIKO draws the conclusion that the “complexity of the spatial, temporal and energetic parameters of the movement activity in the competition with the appropriate target level (is) the source base for the construction of the movement activity in training ...!“ (a.a.O., 43following).

#### TEMPORAL PARAMETRES

- total duration of the competition
- duration of single movement sequences
- rhythm
- frequency
- competition time (day, week) etc.

#### SPATIAL PARAMETRES

- distances covered in the game
- all locomotions in space (jumps, etc.)
- spatial constellations in the body (joint corner)
- precision standards - aim accuracy etc.

#### ENERGETIC PARAMETRES

- forms of exertion in the area of strength (isotonic, isometric, reactively)
- forms of energy supply (aerobic/anaerobic, lactazid/alactazid)
- influence of the sports equipment on the strength demand etc.

The model of training exercises must be aimed in the temporal, spatial and energetic courses and structures of the competition. The given examples of temporal, spatial and energetic parameters of sport activities are not complete and vary in importance according to sport. BOIKO formulates the demand of the modelling of the aim practise (competition activity) in the training process as a „principle of the temporal, spatial and energetic reflectance of the aim“. In general the competition activity can be described as shown in illustration 1: The temporal, spatial and energetic parameters are claimed 100%. Through the different models of single parameters above and/or below the level of the aim practice, BOIKO develops seven types of training exercises (illustration from the 2 to the



8). He assigns these different practise types to certain sport groups and phases of the training process – indeed, only type 5 and 6 are recommended under certain objectives for handball players.

### **The expansion of BOIKO's theory in handball**

As the following arguments will indicate, BOIKO's three parameters do not appear to be sufficient for the game of handball. The key starting point is hereby, the tactical determinacy of the game activity: "There are numerous factors – having an immediate effect and difficult to be calculated, contrary acting players, hard to penetrate through, relatively small, agile, quickly flying, not easily controllable or predictable ball, the goal guarded by the goalkeeper, protected through a throw circle – which create relatively big, and varied scopes of action within the scope of an agreed set of rules and in a restricted space." (MÜLLER/STEIN/KONZAG 1992, p. 15).

The exploitation of this free space puts high demands on coordination and speed: Because of the varied situations and movements in handball, in which one must act very fast, the motor, coordinative components acquire great importance. A 100m runner needs a stable, highly specific coordination to occur at maximum speed to the aim – however, this differs from the more adaptable coordination of the handball player, who moves forward, backward and sideways and at the same time needs to perform different tasks with his hands (catching, passing, dribbling). These actions can be coordinated simultaneously and / or perform his succession, but they are never identical to the previous situations, but always depending on the actual game play and behavior of the opponent. Therefore, the following is added: The fast running player with fast hands should additionally

- observe the game,
- receive all relevant information ("key signals", e.g., movements of players, opponents and the ball)
- estimate the further development of the game ("anticipate", e.g., action intentions of players and opponents) and
- respond with a situation-appropriate action ("Action goal and program decisions", such as a shot on target or more games; shot on target as a blow or a jump shot).

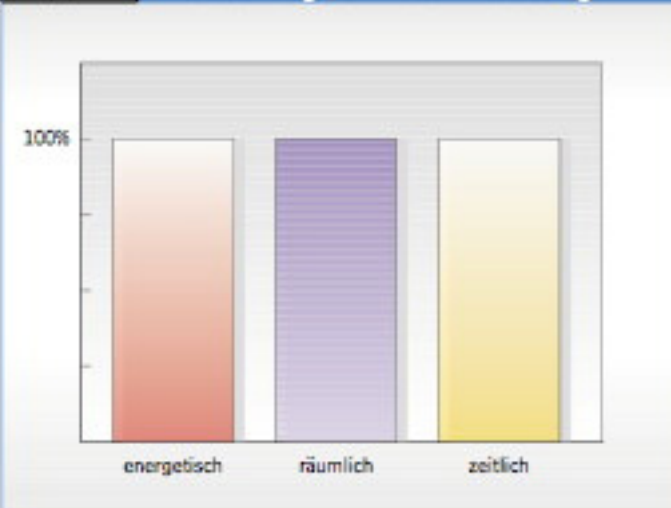
These cognitive processes (information acquisition and processing) must also occur very quickly, otherwise if the player reacts too late the element of surprise is lost. The overriding importance of information-processing (perception, anticipation, action planning) increases under the target of offensive defense game (keywords: pressure to act for the attacker, larger spaces, hindered perception of width and depth). Therefore, the introduction of the fourth parametre "information" seems logical and consiquent (fig. 9).

### **INFORMATIONAL PARAMETRES**

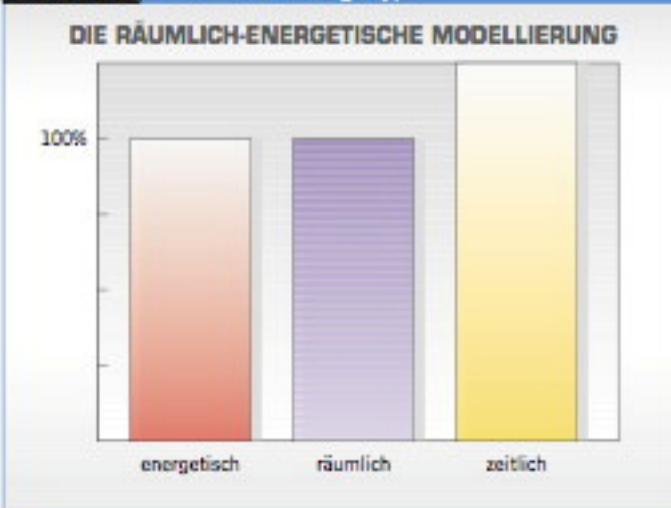
- positions and movements of the ball
- positions and movements of the players
- positions and movements of the opponents
- psychological distress etc.

In training-scientific literature, the power-determining influence of psychological stress on the athlete during a competition has been widely recognized and described. Just like with energy demands, the burden from the stress differs from one athlete to the other. Additionally, the influence of the optimal activation and strain point is strongly dependant on situation variables, e.g., resinous ban, long journey, unusual play appointment, relations in the team, relation to the trainer, meaning of the game etc. Even if this stress is not measurable, it can still be simulated by experienced trainers with good knowledge of coaching athletes (Keyword: Stress Training). Based on the model of training practise, the required level in the competition can be advanced or less advanced, based on the objective. In this sense, a simulation of the psychological demand is also conceivable, as it – firstly – accompanies every movement execution, albeit in a high degree, and secondly, in learning processes or in an overload in other parameters should be maintained low.

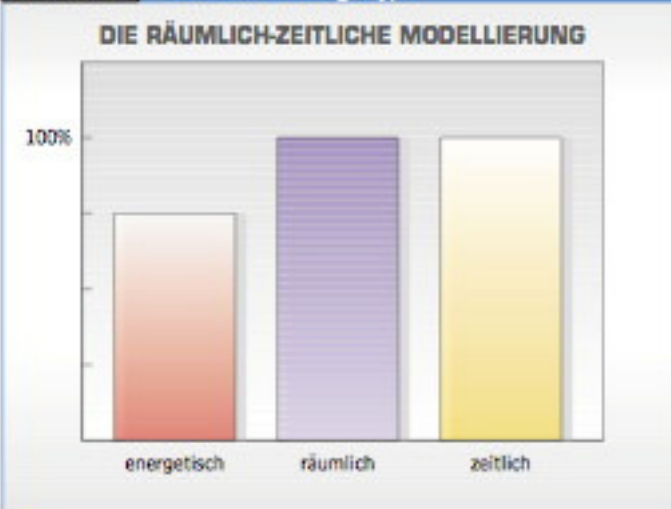
**Abb. 1** Darstellungsform der Zielübung



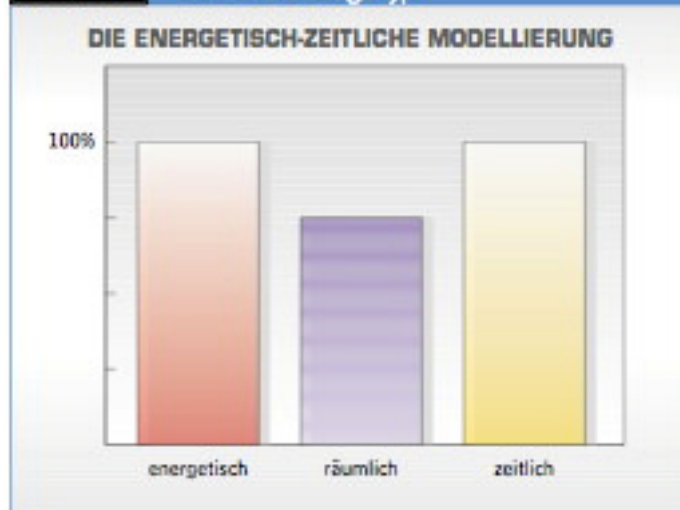
**Abb. 2** Der 1. Übungstyp



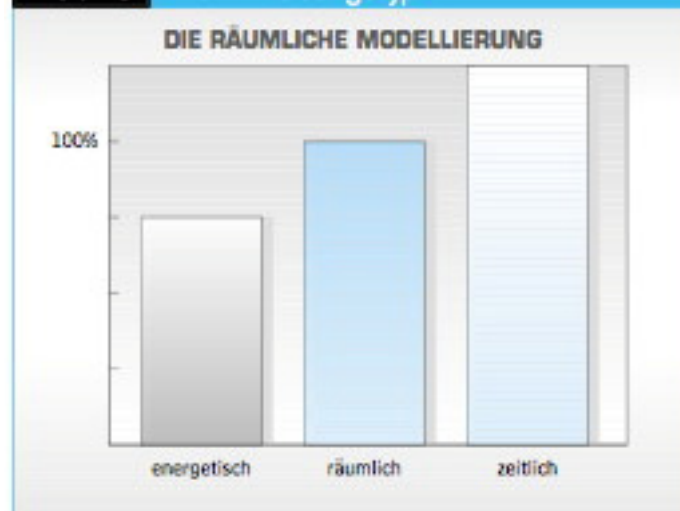
**Abb. 3** Der 2. Übungstyp



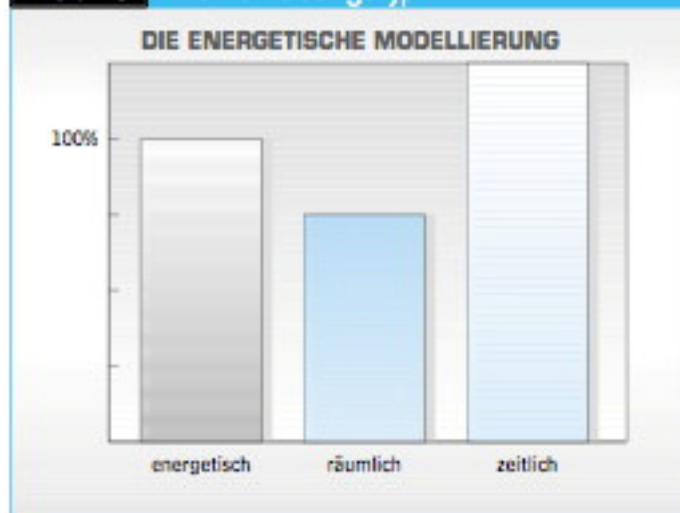
**Abb. 4** Der 3. Übungstyp



**Abb. 5** Der 4. Übungstyp

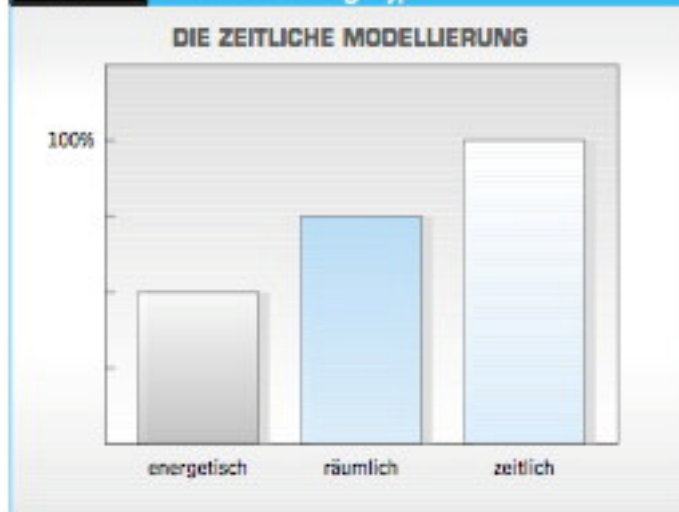


**Abb. 6** Der 5. Übungstyp

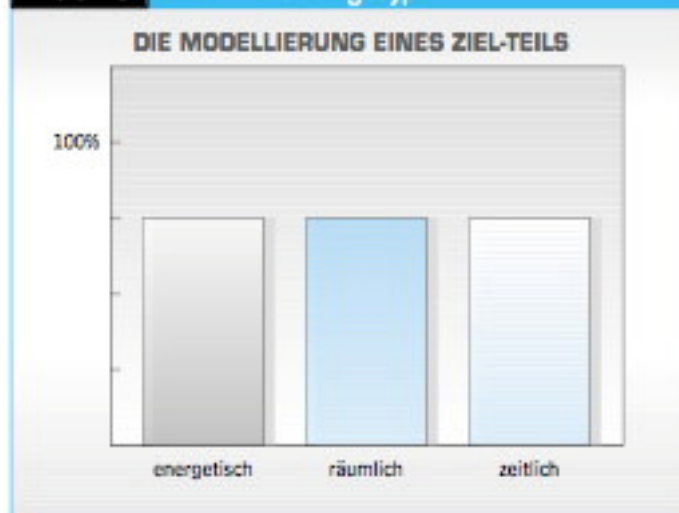




**Abb. 7** Der 6. Übungstyp



**Abb. 8** Der 7. Übungstyp



**Abb. 9** Darstellung der Zielübung

