



US 20070293371A1

(19) **United States**(12) **Patent Application Publication**
Hilfiker et al.(10) **Pub. No.: US 2007/0293371 A1**(43) **Pub. Date: Dec. 20, 2007**(54) **DYNAMICALLY ADAPTABLE STAMINA
SPORT TRAINING PROGRAM****Publication Classification**(51) **Int. Cl.**
A63B 71/00 (2006.01)(52) **U.S. Cl.** **482/9**(76) Inventors: **Beppo Hilfiker**, Biel-Benken (CH);
Georg Ladig, Bierdorf (DE); **Robert
Kuhnen**, Baiern (DE)

Correspondence Address:

**WEINGARTEN, SCHURGIN, GAGNEBIN &
LEBOVICI LLP
TEN POST OFFICE SQUARE
BOSTON, MA 02109 (US)**(57) **ABSTRACT**

A stamina sport training program is described, which is computed by way of evaluation of personal training data of a training person. The stamina sport training program is dynamically adapted by way of inputting a training goal and a possible time budget. A training person registers on an internet portal (13) which is connected to a computation device (10). The computation device (10), from readings which are recorded and stored with a measurement device (20) during a training session (2) of the training person, and additional input parameters able to be inputted by the training person, calculates the stamina sport training program of the pending training sessions in the future. On computing the stamina sport training program, the stored readings and input parameters of the implemented training sessions (2) are also taken into account.

(21) Appl. No.: **11/640,464**(22) Filed: **Dec. 15, 2006**(30) **Foreign Application Priority Data**

Dec. 16, 2005 (CH) CH-1992/05

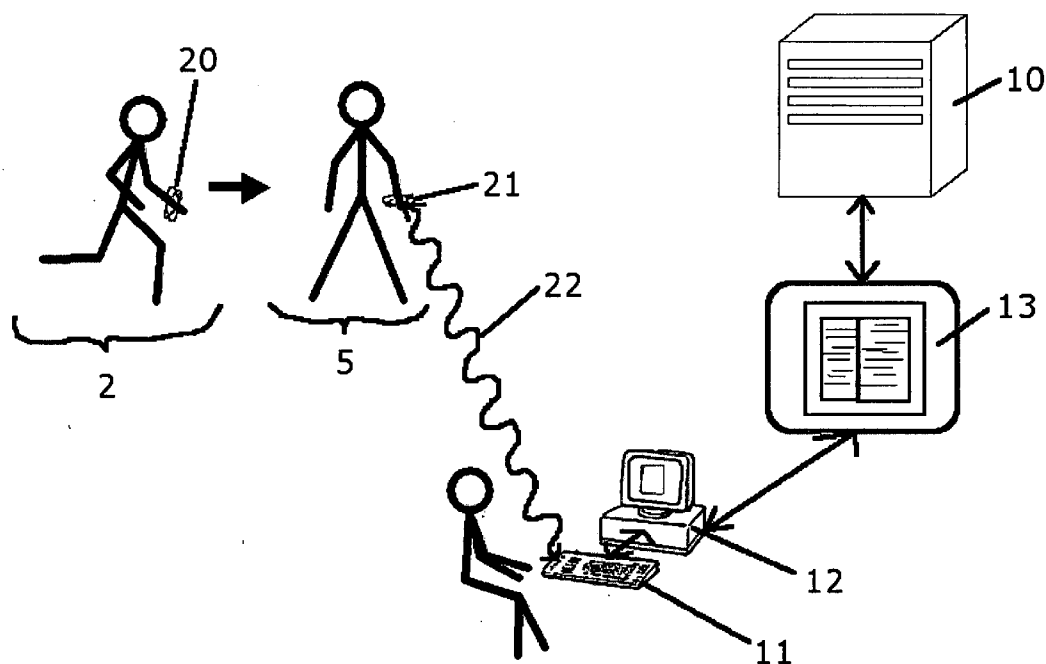
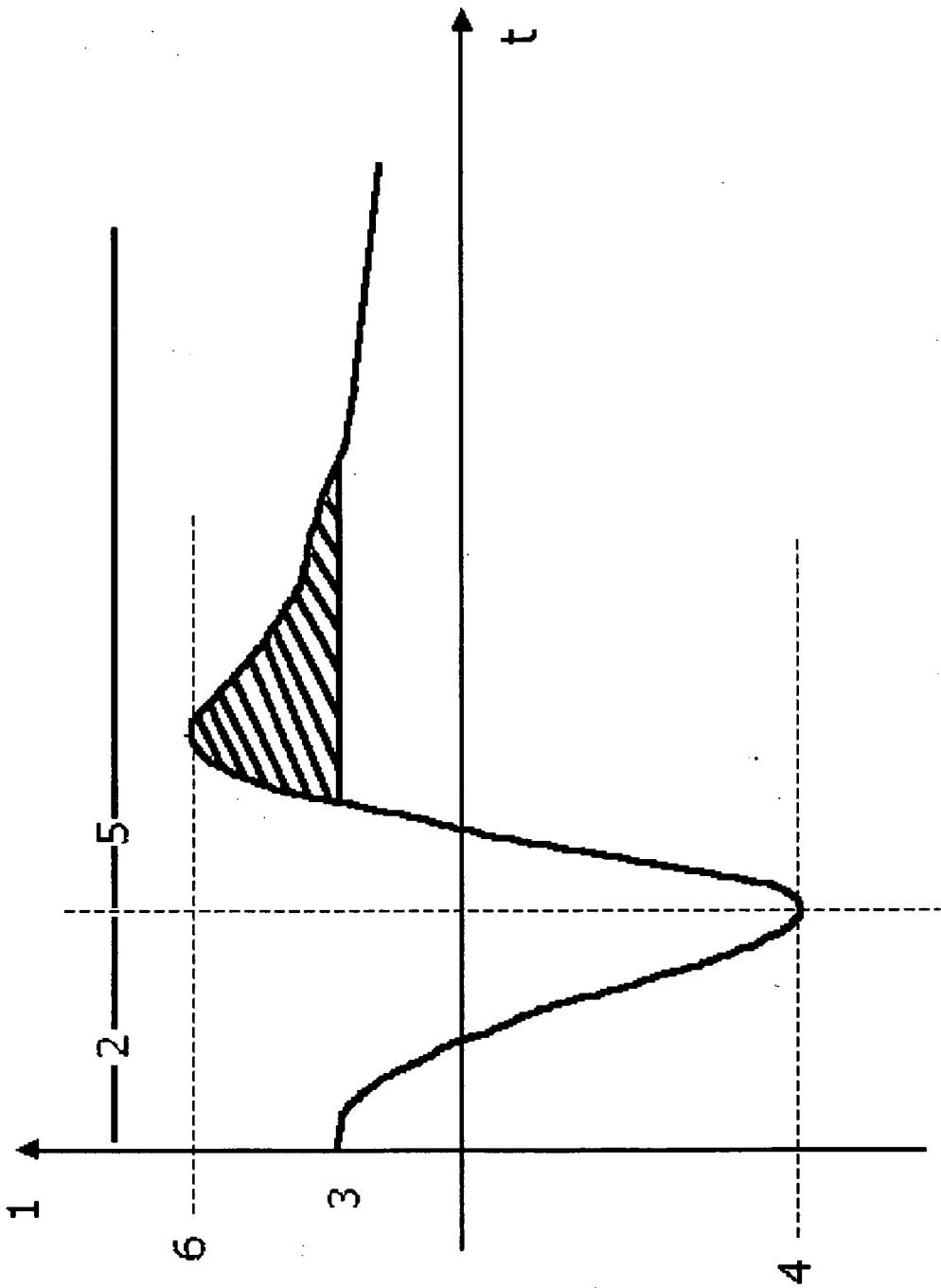


Fig. 1



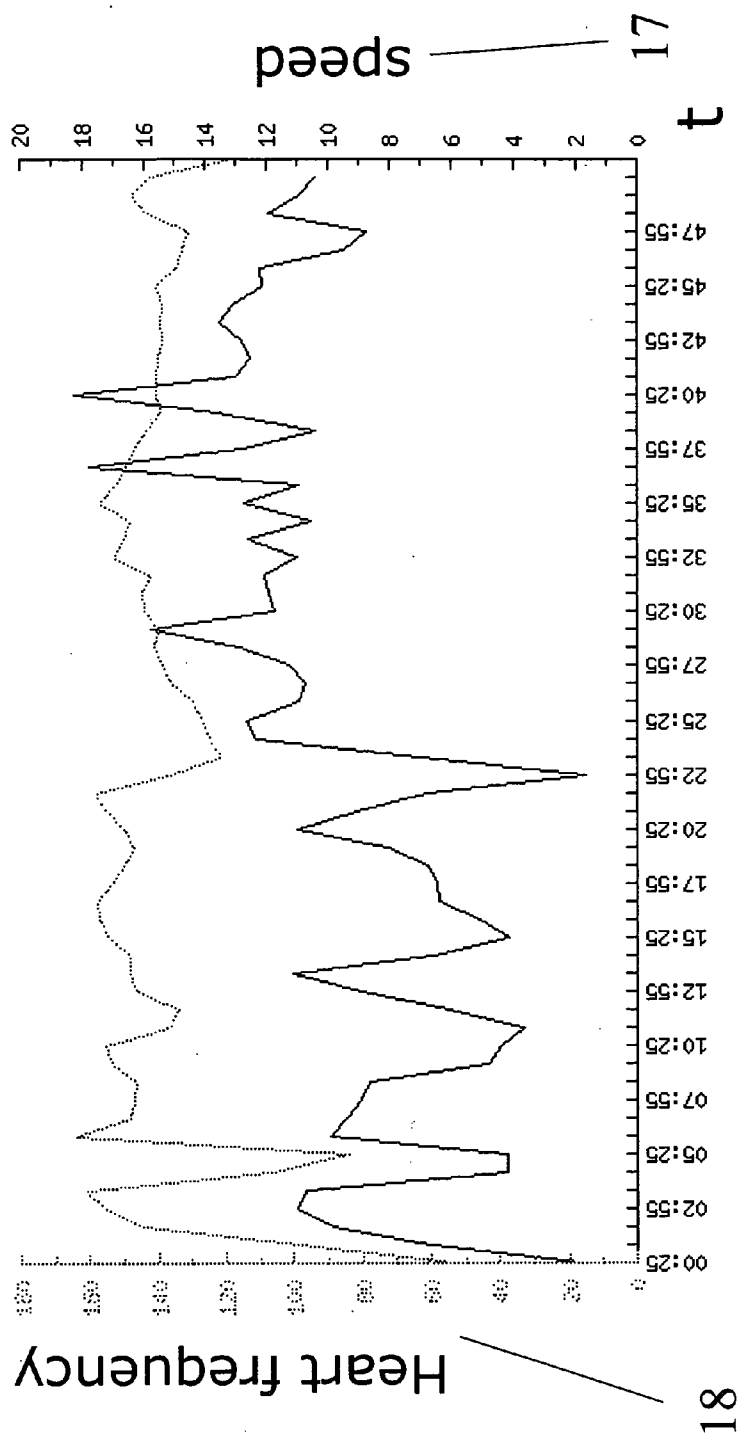


Fig. 2

Fig. 3

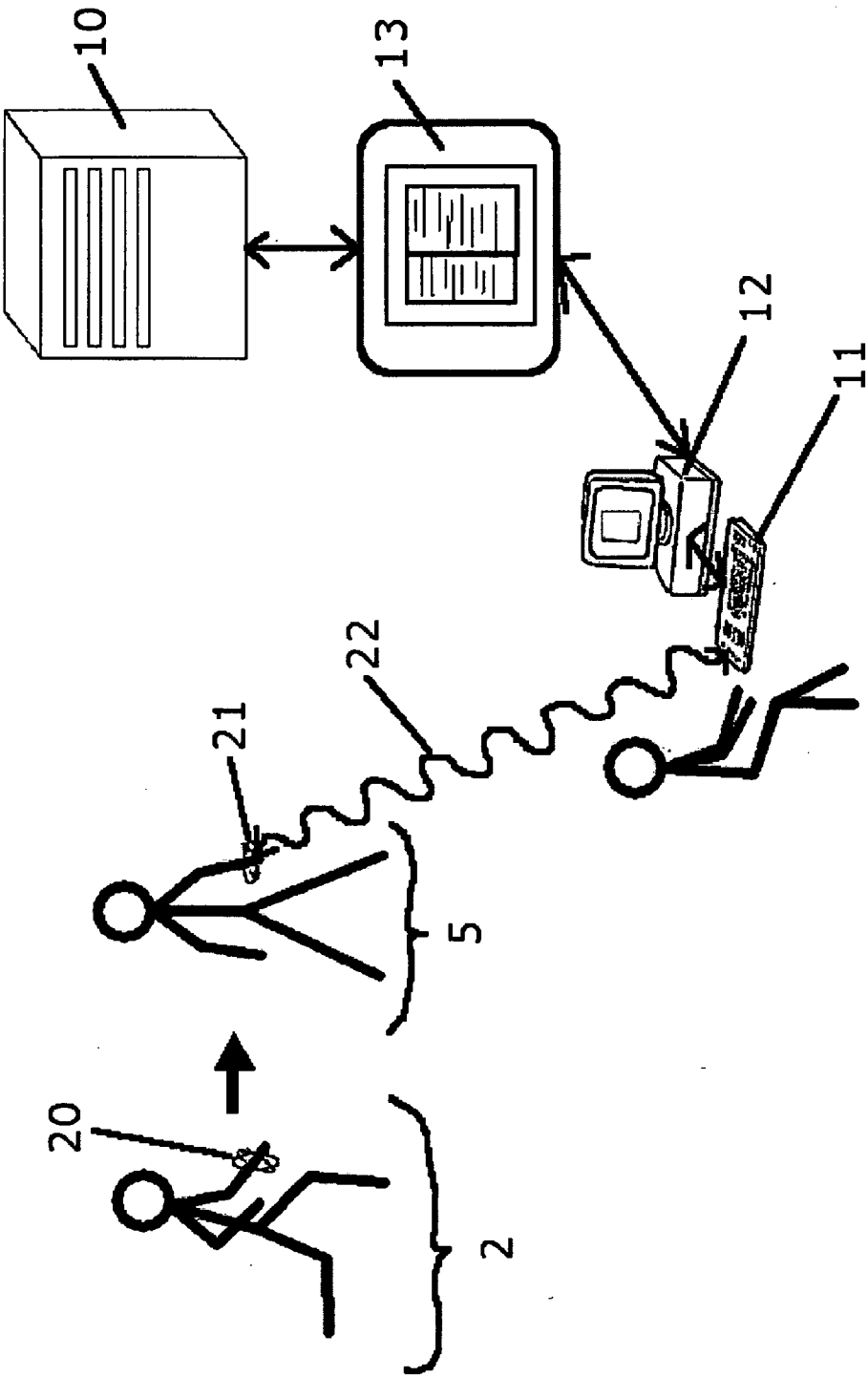
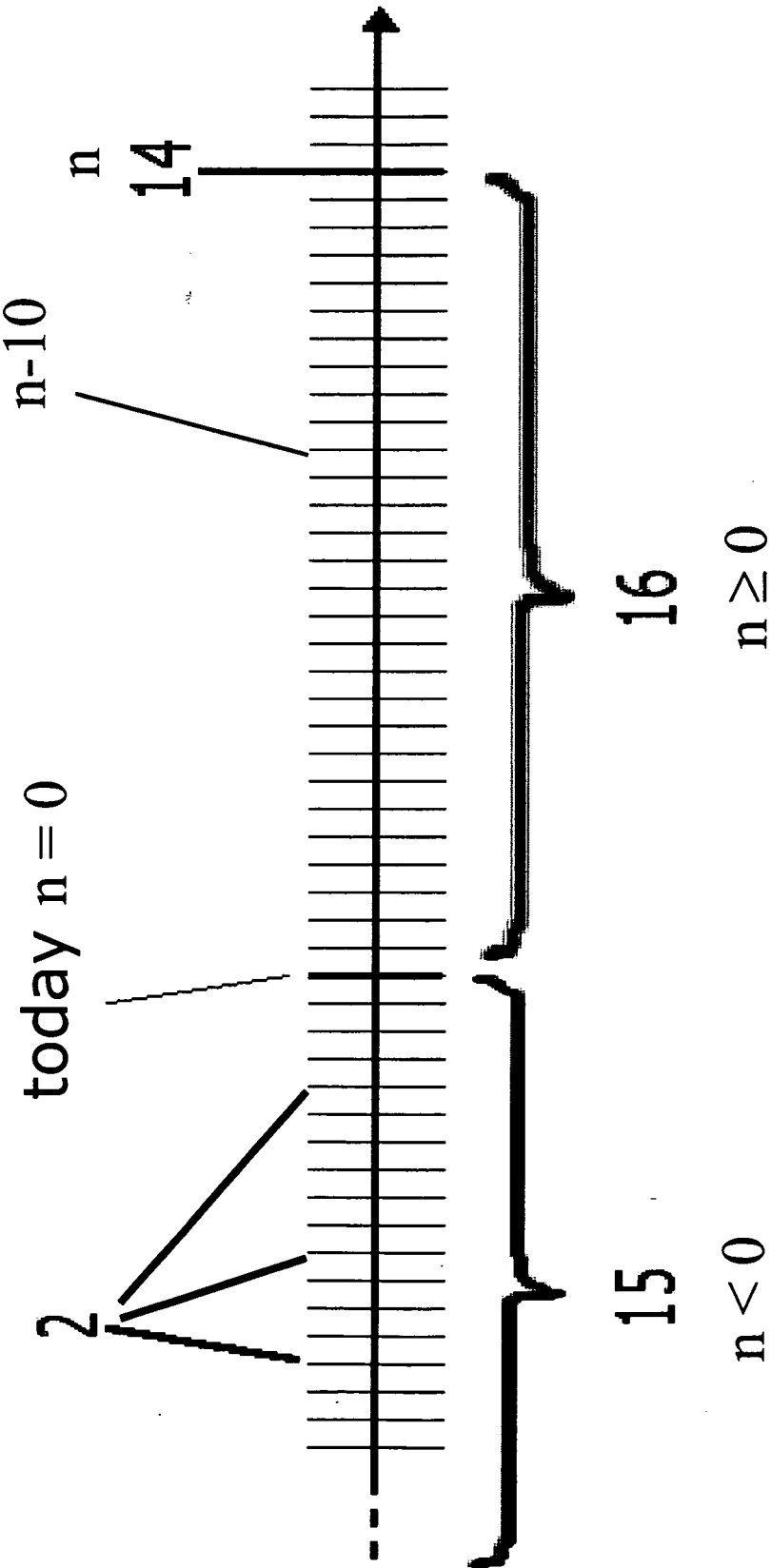


Fig. 4



DYNAMICALLY ADAPTABLE STAMINA SPORT TRAINING PROGRAM

TECHNICAL FIELD

[0001] The present invention describes an analysis method for evaluating personal training data, in that readings are recorded with a measurement device during the training session, are stored, and after completion of the training session, are transmitted by a transmission unit to a computation device.

STATE OF THE ART

[0002] Various methods, are known in order to read out physiological training parameters of a test person during sports training, store them and use them for setting up a training program.

[0003] The development of portable measurement devices with microprocessors, for determining exertion exposure during sports training, in particular during stamina training, forms the basis for the method according to the invention.

[0004] Such a device is described in EP 0748185 B1. Here, the heart frequency of a training person is measured by way of electrocardiography during the complete exposure phase, for a favorable and simple evaluation and monitoring of the aerobic and anaerobic thresholds. The heart frequency thus serves for monitoring the training effect, since one may train in a controlled manner in the exertion exposure range desired by the person carrying out the training. Apart from storing the readings, these are also displayed on a monitor, so that the person carrying out the training may read off his momentary exertion exposure. Apart from computations of the desired target pulse ranges by the microprocessor and the internal memory of the measurement device before a training session, desired training programs may be programmed by the training person.

[0005] The explained method serves for recording, storing and the display of the readings during a training session. Extensive training programs which apart from target pulse ranges of the training person, also comprise further nominal values, may neither be programmed by way of the disclosed method, nor may they be computed by the measurement device.

[0006] The method of EP 1206306 B1 goes a step further for generating training programs. The disclosed method registers and analyses values, which when carrying out a training session, may be counted and measured, and generates training programs from these. Characteristic parameters are computed for the training person after the input of training data into an input unit. A characteristic profile of a training person is formed from this, and is compared to a standard characteristic profile of a group of training persons, or of an average training person. The standard characteristic profiles originate from a reference data bank. With this, the characteristic profile of a training person is compared to the standard characteristic profile of a group, for generating a training program.

[0007] The conclusions with regard to the performance of a training person are thus referenced only to averaged values of a reference group, by which means no individual training planning matched to the training person, takes place. Furthermore, the method does not take into account any training

planning for a competition. Thus no goal-orientated training planning is disclosed, which optimizes and dynamically varies the training programs with regard to the remaining time. The results of the completed training session are merely analyzed by way of comparing the values to a reference data bank. This procedure is sufficient for the broad spectrum of sportspersons who wish to keep fit and would rather carry out their sport without any goals, who attain average performances on account of the averaging method.

[0008] A goal-orientated method is represented in US 2004241629 A1. Here, personal data of a training person such as size, weight, fitness and nutritional habits are inputted together with a goal, such as preparation for a competition or weight reduction, and utilized for determining a training program. A fitness test with a smaller number of exercises is utilized, in order to estimate the fitness level of the training person, in that it is compared to a data bank of fitness levels of a comparison group.

[0009] In order to generate a training program for a cardiovascular system, only the maximal pulse of the training person forms a basis, and the training pulse to be achieved is computed therefrom, depending on the fitness level of the training person which is determined previously. This fitness level must be newly defined by the training person by way of a test, so that it may enter into the generation of the training program. The training program would have to be adapted dynamically to the improved fitness of the training person, for increasing the performance. This however, is only possible with this method if the fitness test for determining the fitness level is carried out after each training session.

[0010] Since the fitness of the training person in this presented method is however also only compared to a comparison data bank, the resulting training program is only tailored to the average training person, and not personally to the training person.

DESCRIPTION OF THE INVENTION

[0011] It is the object of the present invention to provide a method for the dynamic adaptation of a stamina sport training program, which is personally matched to the training person, and is newly computed after each training init. This stamina sport training program, by way of computation to inputted training goals, such as a competition or a desired weight reduction, is adapted to a target weight at a future date.

[0012] The feedback of the attained performances of the training person has a direct influence on the computation of the stamina sport training program.

[0013] Apart from input parameters, readings during the training session are recorded by a measurement device and stored, and after the training session, are sent together to a computation unit for computing the future stamina sport training program. Such a personalized and dynamic stamina sport training program registers the changes in the performance, and a weight reduction of the training person, and the training planning may be matched to the training person in an optimal manner by way of this.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The invention is hereinafter described in combination with the drawings.

[0015] FIG. 1 shows a schematic representation of the principle of super-compensation.

[0016] FIG. 2 represents an exemplary heart frequency and speed time curve of a training session.

[0017] FIG. 3 schematically shows the transmission of readings and input values to the computation unit for the computation of the stamina sport training program.

[0018] FIG. 4 illustrates how the stamina sport training program is computed for future training sessions.

DESCRIPTION

[0019] The goal of the stamina sport training is to increase the stamina, which indicates the capability of attaining greater performances over a longer period of time. The stamina sport training has a particularly positive effect on the cardiovascular system of a training person. Further training effects are an improvement of the metabolism, fat burning which is of significance with weight problems and may lead to weight reductions, as well as the strengthening of the immune system. In order for the stamina sport training to be able to be carried out in an effective manner, each training person must train according to a stamina sport training program, which is optimized to attaining the above-mentioned positive effects.

[0020] Whereas with competitive sports, it is mainly the increase of the stamina capability which is desired for improving the training times and thus the competition times, the average sportsman wishes to improve his metabolism and increase the anaerobic threshold, the highest possible exertion without increasing acidaemia. The training person who has to battle with weight problems may apply a targeted training for weight management.

[0021] As training science teaches, the training planning for stamina sport training is based on the principle of periodisation, the controlled alternation of exertion and recovery of the organism of a training person. The adaptation of the performance of a training person takes place during training pauses between training sessions 2. The training pauses for this reason, must be planned in a targeted manner in order to obtain the desired results.

[0022] The stamina sport training program presented here, apart from the periodisation, also utilizes the principle of super-compensation known from sports medicine. Thereby, one utilizes the effect that the performance 1 of a training person during a training session 2, reduces from a performance base level 3 to a minimal performance 4 at the end of the training session 2 due to exertion. During the subsequent regeneration phase 5, the performance 1 increases to the super-compensation level 6, wherein the initial performance base level 3 is exceeded for a short time.

[0023] The increased performance level is utilized for further increasing the performance by way of setting the next training session 2 in the time period of super-compensation. Intensive training consumes the capability for regeneration, which is taken into account on planning the training. The matching between exertion phases and regeneration

phases must be optimised, for increasing the performance, and for preventing overtraining.

[0024] The method according to the invention starts from input parameters 7 and readings 8, which are recorded during each training session 2, for determining a stamina sport training program. Thereby, a personal stamina sport training program 9 is computed for each training person.

[0025] In one embodiment, the training person may log into a commercially operated internet portal 13 protected by password, which is connected to a computation device 10, which carries out the later computation of the stamina sport training program 9. With the very first access to the computation device 10, the training person sets up a user account by way of him inputting details with regard to his person, such as name, date of birth, weight, size, time zone in which the training person is located, sex and sport type (running, cycling, swimming, amongst others) by way of an input unit 11.

[0026] This input unit 11 may be a common desktop personal computer, a transportable laptop, a handheld computer or also a mobile telephone with a suitable web browser function. Furthermore, input parameters 7 may also be inputted by way of mobile telephone applications and via SMS.

[0027] The transmission of the inputted data to the computation device 10 is effected via transmission means which consist of several units. The input unit 11 and a transmission unit 12 which is connected to the input unit 11 belong to these. Thereby, the transmission unit 12 may transmit the data from the input unit 11 to the computation device 10 in a wireless manner, per wireless LAN, bluetooth or via a cable connection, via the internet portal 3.

[0028] One input parameter which must be inputted is the training goal of the training person. This training goal may be a competition at a date in the future, or a weight reduction by a certain date. This training goal is important for the dynamic adaptation of the stamina sport training program, since the date of the training goal is compellingly required for the computation of the contents of the individual training sessions 2, up to the desired deadline.

[0029] Input parameters which are likewise significant for the adaptation of the stamina sport training program of each training person, are the number of training years of uninterrupted training, and the possible weekly training time, thus the time budget of the training person per week. Whilst the number of training years is of interest at the beginning of the creation of the stamina training program and gives a first impression of the possible regeneration time of the training person, the often varying time budget is continuously used for the adaptation of the stamina sport training program.

[0030] The training-specific input parameters 7 include measurable variables such as weight, pulse rate at rest of the training person in the morning, and the sleep duration, as well as subjective values, such as quality of sleep, regeneration capability and stress factor of the training person. After these parameters 7 have been inputted via the input unit 11, and transmitted to the computation device 10, these are taken into account on computation of the stamina sports training program 9. The input of the current weight is important, above all for training persons who use the

stamina sport training program for achieving a target weight, and permits an optimal adaptation of the training.

[0031] Further, training-specific input parameters 7 such as training type, training contents, stretching exercises, training scope, training intensity and training feel are inputted by the training person after each accomplished training session 2. The training person has a selection of response possibilities, in order for the input parameters 7 such as training scope, training intensity and training feel which are evaluated by the training person in a subjective manner, to be able to be included into the adaptation of the stamina sport training program. A direct feedback of the training person with the computation device 10 takes place via the input parameters 7, by which means the stamina sport training program 9 is adapted to the regeneration capability and/or the course of the weight of the training person.

[0032] An adaptation of the stamina sport training program 9 is effected after changing the input parameters 7. The stamina sport training program computed for the next training sessions 2 are evaluated afresh proceeding from the input parameters 7.

[0033] Each training session 2 is characterized by the scope and intensity of the exertion. The scope of the training session 2 is determined by the duration of the training session 2 and the type of the exercise forms to be carried out, such as permanent exertion below the anaerobic threshold, or interval exertion in the aerobic-anaerobic transition region, with pauses between the intervals.

[0034] The intensity of a training session 2 is divided into different regions dependent on the heart frequency. Thereby, one differentiates between the peak region, the development region, the base region and the compensation region with a reducing heart frequency. In order to set the optimal training stimuli, the training sessions 2 are matched such that the intensity and the scope of the training session 2 are matched to the regeneration condition of the training person.

[0035] A portable measurement device 20 is applied for the control of the actually attained performance during each training session 2. This may record the heart frequency 18, the speed 17 or other readings 8 which are proportional to the attained performance, and which may be used for the later evaluation and computation of the stamina sport training program 9. The recording of the readings 8 is effected automatically during the training session 2 and does not disturb the training person, so that he may fully concentrate on his training.

[0036] The recorded readings 8 are transmitted by way of a transmission device 21 in the measurement device 20 via a transition path 22, via input unit 11, the transmission unit 12 and the internet portal 13, to the computation device 10, after each training session 2. The transmission path 22 may be realized by an interface cable, or a wireless connection, such as a bluetooth or infrared connection.

[0037] A further possibility lies in the transmission of the readings 8 by the transmission device 21 from the measurement device 20 via bluetooth to a bluetooth-compatible mobile telephone, which leads the readings 8 per telephone signal directly to the computation device 10.

[0038] The stamina sport training program 9 consists of a calendar listing of training sessions 2 with computed scope

and computed intensity. Possibilities for the design of the training sessions 2 in the stamina sport training program 9 are text form and/or symbolic representation which is simple to read and is very widespread with electronic display means.

[0039] The dynamic adaptation of the stamina sport training program 9 to a registered user presupposes a training goal 14 at a respective target date which has been inputted as an input parameter 7 by the training person.

[0040] From the training goal 14, the computation device 10 computes back from the future training session 16=n up to the present date with the pending future training session 16 with n=0, thus with the input parameter 7 of the time budget of the training person, computes the number and the duration of the possible, future training sessions 2. Thereby, one also takes into account the fact that the training person may or wants to accomplish more than one training session 2 per day.

[0041] The intensity and the scope of the further training sessions 16 are initially determined by the input parameters 7 such as the number of training years of uninterrupted training, before the registration on the internet portal 13. After determining the scope of the training stimuli, the intensity of the respective training sessions 2 up to the training goal 14 is determined, and the stamina sport training program 9 is adapted thereto. The training person during each training session 2 must achieve the prescribed intensities which are divided into regions as described above.

[0042] The readings 8 are transmitted to the computation device 10 after completion of a training session 2. Suitable readings 8 for runners are the measured speed 17 or the heart frequency 18 during a training session 2, from which one may draw conclusions on the attained performance.

[0043] The measurement of the attained performance with training sessions 2 on a bicycle or on a bicycle ergometer is possible in a simple and direct manner with a respective performance measurement device. The performance data from a performance measurement device are transmitted to the computation device 10 as with other readings 8.

[0044] The computation device 10 compares the readings 8 with the required intensities and the scope of the considered training session 2, and from the readings 8, computes performance time curves, determines the time intervals in different training regions, and stores the results in the user account of the training person. Additionally, the computation unit 10 evaluates training-specific input parameters 7 of the training person, thus with the readings 8 and the subjectively selected input parameters 7, determines the stamina sport training program 9 for the future training sessions 16 n=1 to n.

[0045] If readings 8 and input parameters 7 from the accomplished training sessions 15 are already present on the user account, the computation device 10 additionally computes the intensity and the scope of the pending future training session 16 from the history values of the performed training sessions 15. Thereby, the readings 8 and the subjectively selected training-specific input parameters 7 of each training session 15 with <0 are included in the consideration, in order to determine the prior exertion of the training person before the future training session 16.

[0046] The subjectively selectable training-specific input parameters 7 such as training scope, training intensity and trailing feel, which are able to be inputted after each training session 2, are likewise permitted on the part of the computation device 10 to enter into the computation of future training sessions 2. Thereby, the computation unit 10 computes differences between the regeneration condition of the training person, which has been determined with the first two calculations, and the regeneration condition determined subjectively by the training person by way of input parameters 7.

[0047] The stamina sport training program 9 may very accurately determine the momentary regeneration condition of the training person, by way of the backward calculation of the training time period from the training goal 14 to the closest lying training session 2 $n=0$, the inclusion of the previously accomplished training sessions 15, and the evaluation of the difference of the first two calculations with the subjectively perceived regeneration condition of the training person. Only then is it possible to plan the future training sessions, such that the training person during the training sessions is located in the time period of the super-compensation.

[0048] After the adaptation of the stamina sport training program 9 by the computation device 10, this is represented on the internet portal 12 and may therefore be called up by the training person. The stamina sport training program 9 in a further embodiment is transmitted from the internet portal 13 to the transmission unit 12, and from there to the input unit 11, from where it goes to the measurement device 20 of the training person, via an interface cable 22, or alternatively via a wireless connection such as a bluetooth or infrared connection. Thus the training person during the training session 2 may have a view of the stamina sport training program 9.

[0049] The individual training sessions 2 may be optimally matched to achieving the goal of the training person by way of the use of readings 8 and input parameters 7 for the dynamic adaptation of the stamina sport training program 8. If the time budget of the training person changes due to illness or other events, the stamina sport training program is computed afresh by push button, and the training sessions 2 in the remaining time period are matched to the desired training goal. A dynamic adaptation is thus possible at any time.

[0050] A further application possibility of the dynamically adapted stamina sport training program 9 is the field of wellness which is becoming more popular. The general well-being of the training person is increased by way of the targeted application of the stamina sport training program 9 and the suitable choice of the training goals 14.

LIST OF REFERENCE NUMERALS

- [0051] 1 performance capability
- [0052] 2 training session
- [0053] 3 performance basic level
- [0054] 4 minimal performance capability=fatigue
- [0055] 5 regeneration phase
- [0056] 6 super-compensation level

- [0057] 7 input parameter
- [0058] 8 readings
- [0059] 9 stamina sport training program
- [0060] 10 computation device
- [0061] 11 input unit
- [0062] 12 transmission unit
- [0063] 13 Internet portal
- [0064] 14 training goal
- [0065] 15 implemented training sessions in the past
- [0066] 16 pending training sessions in the future
- [0067] 17 speed
- [0068] 18 heart frequency
- [0069] 20 measurement device
- [0070] 21 transmission device
- [0071] 22 transition path (interface cable, bluetooth or infrared connection).

1. An analysis method for evaluating personal training data, by way of recording readings with a measurement means during the training session, storing them, and after completion of the training session, transmitting them to a computation device by way of a transmission unit, characterized in that additionally to the readings, input parameters changeable by the training person are inputted by way of an input unit, and transmitted to the computation device, and the computation device computes a dynamic adaptation of a stamina sport training program from the readings and the input parameters.

2. An analysis method according to claim 1, characterized in that the dynamic adaptation of the stamina sport training program is carried out after each training session.

3. An analysis method according to claim 1, characterized in that the stamina sport training program is dynamically adapted to at least one training goal, such as competition date and/or a target weight at a future target date.

4. An analysis method according to claim 1, characterized in that the measurement device is a commercially available, portable pulse monitor.

5. An analysis method according to claim 1, characterized in that the readings include heart frequency readings and/or speed values, which are recorded during the training session.

6. An analysis method according to claim 1, characterized in that the readings include performance data from a performance measurement device, which during the training session are recorded on a bicycle or bicycle ergometer.

7. An analysis method according to claim 1, characterized in that the dynamic adaptation of the stamina sport training program is carried out after each change of the input parameters.

8. An analysis method according to claim 1, characterized in that the input parameters include at least compulsory values such as training type, training content, stretching exercises, training scope, training intensity and training feeling.

9. An analysis method according to claim 1, characterized in that the input parameters include additional values such as

weight, pulse at rest in the morning, sleep duration, sleep quality, regeneration capability and stress factor of the training person.

10. An analysis method according to claim 1, characterized in that the input parameters are transmitted to the computation device via a desktop computer which is connected to the internet.

11. An analysis method according to claim 1, characterized in that the input parameters are transmitted to the computation device via a portable computer.

12. An analysis method according to claim 1, characterized in that the readings are transmitted from the measurement device to the computation device by way of transmission means, by way of cable connections and/or in a wireless manner, and the computed stamina sport training program after the dynamic adaptation, by way of transmission means, by way of cable connections and/or in a wireless manner, is transferred from the computation device back again to the measurement device.

13. An analysis method according to claim 1, characterized in that a personal stamina sport training program is

computed for each training person, and is allocated to the mentioned training person in a manner protected by password.

14. An analysis method according to claim 1, characterized in that the computed stamina sport training program is made accessible to the training person on an internet portal protected by password.

15. An analysis method according to claim 1, characterized in that the computed stamina sport training program is represented to the training person on the display means of the measurement device.

16. The use of the method according to claim 1, for the targeted weight reduction.

17. The use of the method according to claim 1, for the targeted increase in performance at a temporal fixed point in time.

18. A use of the method according to claim 1, for increasing the comfort of the training person in the field of wellness.

* * * * *