Footwear with unstable sole structure for statically optimal body posture and healthy dynamics comprising an upper and a sole structure attached to the upper, the sole structure having a wearing layer contacting the ground, a bottom layer attached to the wearing layer, an upper layer attached to the bottom layer, and a stiffener plate contacting the upper layer. A bottom layer covering the tread surface is attached to the wearing layer extending at least over the side surfaces of the bottom layer. An upper layer covering the tread surface is attached to the bottom layer, the upper layer comprising a support projection dimensioned to at least match the print of the arch of the foot, with the material of the bottom layer being more resilient than that of the upper layer. The stiffener plate contacting the upper layer covers the tread surface with a cross-section decreasing towards the toes.
FOOTWEAR WITH UNSTABLE SOLE STRUCTURE

[0001] The invention relates to footwear with unstable sole structure for restoring and/or maintaining statically optimal body posture and healthy walking and running dynamics, for child and adult users, comprising an upper and a sole structure designed to conform to the physiology of normal rolling gait, where the sole structure is attached to the upper, and where the sole structure has a wearing layer adapted for contacting the ground, a bottom layer attached to the wearing layer, an upper layer attached to the bottom layer, and a stiffener plate arranged such that it contacts the upper layer.

[0002] There is a fundamental human need for bodily movement, including walking. However, the fulfillment of this need has become more and more removed from the natural environment with the advance of civilization. Walking barefoot on natural terrain members of previous generations were forced into “walking actively” by tracking and constantly adapting to irregularities of the ground, which caused muscles to be used (loaded) to a suitable extent. This sustained level of muscle load resulted in maintaining healthy circulation and sufficient levels of cell and tissue metabolism. The flat, artificial terrains of today’s cities, together with flat-sloped terrain driven footwear and sedentary lifestyle often lead to the underuse of muscles and muscular dysfunction. Consequences include weakened muscles, ruptured muscle balance and the overloading of joints. An insufficient level of muscle load, prolonged over time, not only starts pathological processes in the motive apparatus but has an indirect negative influence on other apparatuses/organisms. This is in the background of certain diseases of civilization unknown to members of previous generations.

[0003] Ergonomically optimal gait can be achieved only by walking barefoot on uneven ground. It has long been recognized that the optimal (barefoot) gait is the state of being by wearing footwear simulating unstable, uneven terrain. Wearing such footwear causes orientation sensor muscles (deep muscles) to become tensioned, which is indispensable for relieving joints and maintaining physiological body posture.

[0004] The document with publication no. WO 01/15560 discloses footwear for dynamic rolling-walking action. The footwear has an upper for supporting the wearer’s foot, to which is attached a sole structure adapted for producing the feeling of walking barefoot. To accomplish this the sole structure has a middle and a bottom layer. The middle layer is made of a relatively hard resilient material, while the bottom layer is made of softer resilient material. The bottom layer has arcuate segments producing an overall shape suitable for rolling gait. A shortcoming of the solution is that it fails to simulate walking on natural terrain adequately because of the pivot axis formed between the harder and the softer layer. Furthermore, the user has to maintain balance and ergonomically optimal body posture by continuous conscious effort (“aware walking”). A further disadvantage of the invention is that the soft bottom layer may easily get damaged during use.

[0005] Patent description EP 0 999 764 describes a shoe designed for enabling rolling gait. According to the invention the sole structure attached to the shoe upper comprises a sole body and a covering (a wearing layer). A pivot axis is disposed in the wearing layer in the metatarsal area, about which the forward and backward portions may pivot. In the area between the centre of the foot and the heel a recess is formed between the sole body and the wearing layer, wherein a soft, resilient load distribution element is inserted. The shoe according to the invention is capable of providing natural rolling action of the foot during walking, with uniform load distribution. The disadvantage of the invention is that due to the fixed nature of the applied pivot axis it is only partially suitable for simulating a natural tread surface and thus for activating muscles in a near-natural way. A further disadvantage is that wearing the inventive shoe requires both training and constant attention on the part of the user. In case the wearer suffers from serious fallen arches s/he has to focus constantly on preventing ankle pronation (that could cause further impairment) while walking in the inventive shoes. If, such as in the case of small children, it is impossible to train the user for “aware walking”, wearing the inventive shoes may cause further impairment. Consequently, child users or people with more serious health problems cannot use the inventive shoes without medical supervision. Another disadvantage of the shoe according to the invention is that it is prone to get damaged at the edges of the soft load distribution layer.

[0006] Known solutions include corrective insoles, particularly for children, and corrective heel modifications with the aim of preventing calcaneus and ankle pronation. Such a built-in insole is included in “Siesta” children’s shoes produced by Sabaria Shoe Factory since the 1970’s. The insole supports the arches of the foot, aiming at preventing ankle pronation. These prior art solutions provide passive support for the arches of the foot for producing a corrected joint position. However, this optimal position is maintained by the insole instead of active muscle work. This prevents muscles from strengthening and so they are unable to maintain optimal position without support. Thus this solution provides symptomatic rather than etiological (final) treatment. Also, these shoes are incapable of producing a feeling of instability and for maintaining proper muscle tone.

[0007] The aim of our invention is to provide footwear for simulating unstable ground surface without requiring “walking awareness” from the user. The invention is primarily targeted for providing footwear for children whose muscles and joints have not yet been damaged and therefore are optimal subjects for prevention. Advantageous effects of the invention of course also apply for shoes intended for adolescents and adults. In these cases the aim is restoring healthy foot statues and walking dynamics for stopping pathological processes affecting the motive apparatus. A further aim of the invention is to provide a sole structure wherein the side surfaces of the layers, particularly the side surfaces of the more resilient layers are protected against mechanical impact. A still further aim is to provide a cheaper and lighter product through simplifying the manufacturing process of the sole structure.

[0008] The invention is based on the recognition that, walking on the simulated unstable ground surface requires no conscious action (“walking awareness”) on the part of the wearer if the bones of the foot are supported in a flexible manner. A sole structure configured in this manner prevents ankle pronation while maintaining the stimulus necessary for active muscle work. A part of the recognition is that the more resilient layers of the sole may be protected against mechanical damage if the wearing layer is arranged to extend over the edges of the other sole layers. Sufficient protection of the sole structure may also be provided by arranging the side surfaces of the more resilient bottom layer such that it has a concave shape as seen from the front and the rear of the sole structure,
thereby providing that under load the harder wearing layer and upper layer surrounds the bottom layer. It is also a part of the recognition that stiffener plates conventionally applied between the sole structure and the upper are capable of bearing load and providing proper load distribution also when applied in unstable sole structures. Therefore it is not necessary to build additional weight- and cost-raising elements into the shoe's that during normal walking the sole portion under the talus is the first to touch the ground, and the portion under the toes leaves the ground last after a continuous rolling movement. This conforms to the physiology of walking barefoot. A sole structure configured conforming to the physiology of rolling gait is disclosed for instance in document EP 0 999 764. Because such a sole structure is configured conforming to the physiology of rolling gait is included in the prior art it will not be described in detail in the present document. Such a sole structure may be produced by configuring the stiffener plate to conform to the physiology of rolling gait, with the other sole elements being glued to another and to the stiffener plate.

The footwear according to the invention has a sole structure and an upper attached to the sole structure. The upper may be made of materials conventionally applied in the shoemaking industry such as leather, imitation leather, textile, or plastic. The upper may have the conventional configuration of a shoe, sports shoe, boot, or even sandal. Also in a conventional manner, the footwear may comprise an inner lining with the material and configuration of thereof being identical to solutions known in the art.

The sole structure of the footwear according to the invention is assembled from a wearing layer, a bottom layer attached to the wearing layer, an upper layer covering the bottom layer, and a stiffener plate contacting the upper layer. The role of the wearing layer is to protect the underside of the sole structure from premature wear. The wearing layer according to the invention extends at least over the side surfaces of the bottom layer. Apart from providing protection against wear and tear for the surface contacting the ground, such a laterally protruding configuration of the wearing layer is capable of protecting the side surfaces of the softer, more resilient sole elements against mechanical damage. Such a configuration has the same effect as the configuration wherein the wearing layer completely surrounds the entire side surface of the sole structure, but is significantly lighter and is aesthetically more pleasing. According to a preferred embodiment of the invention the wearing layer completely covers the front portion of the sole structure, effectively protecting the front of the shoe from damage and wear and tear.

In a preferred embodiment the wearing layer is made of resilient plastic or rubber providing good grip.

In a further preferred embodiment of the invention the side surface of the bottom layer is arranged substantially perpendicularly to the wearing layer and to the tread surface, and is connected stepwise to the wearing layer. In the context of the present specification the term "substantially perpendicular" refers to a deviation from perpendicular by less than 5°. According to another embodiment of the invention the side surface of the bottom layer is arranged at an acute angle with respect to the wearing layer and the tread surface, with the side surface of the bottom layer being connected flush to the side surface of the wearing layer.

The bottom layer of the sole structure is attached to the wearing layer in a permanent manner, by gluing or welding. The bottom layer covers the entire tread surface, meaning that it extends from the rearmost point of the ankle to the tip of the toes and has a width conforming to that of the sole of the foot.

The bottom layer is preferably made of thermoplastic plastic, particularly of soft, resilient polyurethane. The bottom layer may be made from plastic materials of different resilience in case of different shoe sizes to conform to different user weights. According to a preferred embodiment of the invention the bottom layer comprises through-openings that are included to control the deformation of the bottom layer. The soft, resilient bottom layer creates the feeling of walking barefoot on uneven ground, thereby stimulating muscle activity. Feeling the uneven ground surface, which is needed to adapt to the continuously changing conditions provoked by the unstable sole structure, causes muscles to be tightened by reflex, which in turn relieves joints from load and helps maintain physiological body posture. Healthy walking or running dynamics is important not only for preventing joint or muscle ailments but has beneficial influence on the operation of other organs of the body. The prolonged activity of deep muscles, brought about by the unstable sole structure, enhances circulation and cell and tissue metabolism.

According to an essential feature of the invention an upper layer covering the tread surface is attached to the bottom layer. The bottom layer may be attached to the bottom layer by means of welding, gluing, or the like. According to a preferred embodiment of the invention the upper layer is made from thermoplastic plastic. In the present description the term "tread surface" is used to refer to that portion of the sole structure on which the foot is supported. The tread surface can be defined as a plane figure bounded by curved lines, extending from the rearmost extremity of the ankle to the tip of the toes, having its largest width at the area where the bones of ball of the foot touch it. The foot is supported on the tread surface at the areas where the talus and the bones of the ball of the foot touch it, at the so-called anatomical support distance. Between these two areas the bones of the foot form an arch. The soft soles applied in conventional footwear with unstable sole structure may cause ankle pronation which can only be compensated by "aware walking", that is, by intentionally tilting the ankle outward. According to our invention a harder, relatively less resilient upper layer is attached to the bottom
layer. The upper layer comprises a support projection at least in the area under the arch of the foot. The support projection is adapted for preventing ankle pronation and thereby removes the requirement of mindful use. The addition of a relatively rigid support projection to the sole structure makes it unnecessary to “learn to walk again” in the inventive footwear with unstable sole structure and to focus constantly on keeping balance. Also, the support projection opens up the possibility of using the inventive footwear for small children who do not yet understand instructions. The support projection provides flexible support for the ankle joint while the muscle stimulus for keeping physiological body posture is also maintained. The support projection can fulfill its role if it at least matches in size the print of the arch of the foot. By “print of the arch of the foot” we mean the area where the surface of the sole of the foot does not touch the tread surface while the foot is supported (is resting) thereon.

[0017] According to a preferred embodiment of the invention the largest length of the support projection equals at least the anatomic support point distance of the tread surface, that is, the distance between support points on the thread surface of the calcaneus and the bones of the ball of the foot, and the largest width of the support projection extends at least from the medial edge of the sole structure to the midline thereof.

[0018] The thickness of the support projection is chosen such that it can provide flexible support for the ankle. To achieve this, in the area under the support projection the bottom layer should be thick enough to provide an “unstable environment” for the foot but should not be too thick in order not to lose the ankle-supporting effect. The largest thickness of the support projection should be preferably 60-80% of the largest thickness of the bottom layer. In a preferred embodiment of the invention the largest thickness of the support projection is three-fourths of the largest thickness of the bottom layer.

[0019] The support projection is preferably made of the same material as the upper layer. According to a further advantageous embodiment the upper layer and the support projection form an integral element, but configurations where the upper layer and the support projection are implemented as separate elements (made even of different material) secured permanently together, for instance by gluing, also fall into the scope of the invention.

[0020] In another preferred embodiment of the invention the support projection is connected with a smooth transition to the upper layer at its end near the toes. Supporting the calcaneus by a conventional rigid sole makes walking an extremely painful experience for patients suffering from joint ailments, especially from arthritis. In a preferred embodiment the inventive sole structure comprises a support projection that is terminated in a cutoff at its end near the heel such that it does not cover the support point of the calcaneus on the thread surface. With such a configuration of the support projection the calcaneus touches the soft bottom layer, while at the same time the advantageous effects of the invention are still provided for the user by the support projection. The cutoff may be bounded by plane or curved surfaces. According to a preferred embodiment of the invention the cutoff surface is bounded by a plane that is set at an angle of 18-30° with respect to the midline of the sole structure. According to a particularly advantageous embodiment the angle between the bounding plane of the cutoff and the midline of the sole structure is 21°.

[0021] According to a preferred embodiment of the invention, if required, a further correction of ankle pronation is provided by arranging the surfaces of the wearing layer adapted for contacting the ground and the bottom layer in an elevated manner. In this embodiment the wearing layer is arranged at an acute angle, preferably at 83-87° with respect to the tread surface.

[0022] According to the invention a stiffener plate is in contact with the upper layer. The stiffener plate is made of a hard plastic material, such as PVC, or from a fibreglass reinforced plastic sheet, and has an arcuate surface conforming to the physiology of rolling gait. The stiffener plate is arranged such that it covers the tread surface and has a cross-sectional size decreasing towards the toes. Such a configuration of the stiffener plate provides uniform load distribution and load transfer to the sole structure without hampering the instability thereof. The stiffener plate and the upper layer are glued or welded together. A cover plate, applied in order to make adhesive bonding easier, and/or a support plate adapted for receiving the contacting edge of the upper and comprising cutouts, may also be attached to the stiffener plate portion connecting to the upper layer.

[0023] An arrangement of the sole structure where the side surface of the bottom layer has a concave shape as seen from the front and the rear of the sole structure is also the object of the present invention. In a preferred embodiment the side surface is curved. Arrangements wherein the side surface of the bottom layer is bounded by planes are also included in the scope of the invention. The side surface of the bottom layer may be curved in a concave fashion in its entirety, but the substantially concave configuration of the side surface is also included in the scope of the invention. A “substantially concave configuration” of the side surface involves such arrangements wherein the side surface of the bottom layer is in specific cases broken by openings or has protrusions. The front and rear surfaces of the sole structure may be arranged without having concave side surfaces, particularly in case the portions of the wearing layer that extend as far as the edges of the tread surface are elevated off the ground. In a preferred embodiment of the invention the cross section of the concave surface has a circular arcuate boundary line. According to a further preferred embodiment the cross section of the concave surface is bounded by straight lines.

[0024] The concave configuration of the side surface serves for the protection of the bottom layer, which is made of a more resilient material. The concave surface is dimensioned such that in case the sole surface is put under higher loads, for instance because the user steps on a stone or sharp-edged object, the edges of the wearing layer and the upper layer come into contact, surrounding the material of the bottom layer. In this position the soft, resilient material of the bottom layer is protected against tear and rubbing. Such a configuration of the sole structure significantly increases shoe life.

[0025] The invention will be explained in the following with reference to the attached drawings, where

[0026] FIG. 1 shows a schematic top plan view of the sole structure according to the invention,

[0027] FIG. 2 shows a cross section taken in plane II-II of FIG. 1,

[0028] FIG. 3 shows a cross section taken in plane III-III of FIG. 1,

[0029] FIG. 4 shows a cross section taken in plane IV-IV of FIG. 1,
[0030] FIG. 5 shows a cross section taken in plane V-V of FIG. 1, and
[0031] FIG. 6 shows a cross section taken in plane IV-IV of FIG. 4.
[0032] FIG. 7 shows the sectional view of another embodiment of the inventive sole structure,
[0033] FIG. 8 is the sectional view of a further embodiment of the sole structure according to the invention,
[0034] FIG. 9 is the top plan view of a further preferred embodiment of the invention,
[0035] FIG. 10 shows a cross section taken in plane X-X of FIG. 9.
[0036] FIG. 11 shows a cross section taken in plane XI-XI of FIG. 9, without the upper and the stiffener plate.
[0037] FIG. 12 shows a cross section taken in plane XII-XII of FIG. 9, without the upper and the stiffener plate.
[0038] The schematic to plan view and various sectional views of the sole structure according to the invention are shown, respectively, in FIG. 1 and FIGS. 2-6. The sole structure 1 is composed of a wearing layer 3, a bottom layer 4, an upper layer 5, and a stiffener plate 6. The upper 2 of the footwear is attached to the sole structure 1. The sole structure 1 may be lined with a conventionally applied inner lining (not shown in the drawings).
[0039] FIG. 1 shows the schematic top view of the tread surface 8 of the sole structure 1. The stiffener plate 6 is a PVC plate that is arranged to substantially cover the tread surface 8 extending along the boundary lines thereof. As it is clearly seen in FIGS. 2, 3, the stiffener plate 6 has a non-constant cross-sectional size that decreases towards the toes.
[0040] The upper layer 5, made of polyurethane, is dimensioned to cover the entire tread surface 8. As it is shown in FIG. 6, the upper layer 5 comprises a downwards extending support projection 9 that at least matches in size the print of the arch of the foot. The support projection 9 is connected to the upper layer 5 along a plane, in which plane the cross-sectional shape of the support projection is a plane figure having longer sides touching, respectively, the medial edge of the sole structure 11 and the midline 10 thereof; a first shorter side substantially perpendicular to the midline 10, and a second shorter side terminating in a cutoff 12. The line of the cutoff 12 is set at an angle α with respect to the midline 10, the cutoff being located anterior to the support point of the calcaneus. The value of the angle α is 21°. The upper layer 5 and support projection 9 provide flexible support to the foot while walking, with the heel being supported by the more resilient, softer bottom layer 4.
[0041] The upper layer 5 and the bottom layer 4 are glued together. The undersurface 13 of the bottom layer 4, covering the entire tread surface 8, is glued to the wearing layer 3. The bottom layer 4 is made of a higher-resilience polyurethane compared to the upper layer 5, which provides an unstable state for the foot, successfully simulating barefoot walking. As it is seen in FIG. 6, openings 7 are disposed in the bottom layer 4. The openings 7 are included on the one hand for decreasing the weight of the sole structure 1 and on the other hand for providing a possibility to modify or adjust the resilience of the bottom layer 4.
[0042] It is clearly shown in the cross-sectional views of the sole structure 1 taken in different planes that the sole structure 1 is implemented such that its end portions towards the toes and the heel are elevated to a certain extent (in a manner known from prior art) conforming to the physiology of rolling gait. The bottom layer 4 is bounded by a front surface 20 and a rear surface 21, while side surfaces 14, 15 bound both the bottom layer 4 and upper layer 5. Because the bottom layer 4 and upper layer 5 are arranged to cover each other, the corresponding front, rear and side surfaces of the bottom and upper layers fall into the same plane. As it is shown in FIGS. 4, 5, the side surfaces 14, 15 of the bottom layer 4 and the upper layer 5 are arranged substantially perpendicularly to the tread surface 8 and the wearing layer 3, such that said side surfaces form a single plane. The plane of the side surfaces 14, 15 is arranged with a tilt angle of 5°, tilting towards the middle of the sole structure. The wearing layer 3 extends over the side surfaces 14, 15. Edges of the wearing layer 3 extending over the side surfaces 14, 15 are rounded off. The side surfaces 14, 15 are connected stepwise to the wearing layer 3.
[0043] FIG. 7 shows another preferred embodiment of the sole structure according to the invention. In this embodiment the bottom layer 24 and the upper layer 25 have slanted side surfaces 16, 17. The side surfaces 16, 17 are arranged at an angle of 75° with respect to the tread surface 8. The side surface 26 of the wearing layer 23 is implemented as a plane surface that is connected flush to the side surfaces 16, 17.
[0044] In FIG. 8 a further preferred embodiment of the invention is shown. The side surface 18 of the bottom layer 34, as well as the side surface 19 of the upper layer 35 are arranged substantially perpendicular to the tread surface 8. According to this embodiment the wearing layer 33 is slightly elevated such that the wearing layer is set at an angle of 8°–85° relative to the tread surface 8.
[0045] A further preferred embodiment of the sole structure according to the invention is illustrated in FIGS. 9-12. Similarly to the above described embodiments, the sole structure is made up of the wearing layer 43, the bottom layer 44, the upper layer 45, and the stiffener plate 46. The front portion of the sole structure is completely surrounded by the wearing layer 43. The upper of the footwear and the optionally included inner lining are not shown in the drawings. In this embodiment as well, the stiffener plate 46 substantially covers the tread surface 48, extending from the heel to the support points of the toes. The support projection 49 extends over the midline of the sole structure, and ends with an arced section anterior to the support point of the calcaneus (see the dashed line in FIG. 9).
[0046] The side surface 54 of the bottom layer 44 has a curved, concave shape as seen from the front and the rear of the sole structure. This arced configuration of the side surface 44 is maintained as far as the wearing layer 43 of the front portion. In the preferred embodiment the arc is a circular arc that has a depth essentially corresponding to the thickness of the wearing layer 43. To decrease the weight of the sole structure 1 lightening bores 47 are disposed in the upper layer 45.
[0047] A further advantage of the inventive footwear is that it can be applied to prevent or alleviate diseases of civilization such as fallen arches, joint problems, spine disorders, varicose veins, etc. The sole structure of the footwear is highly resistant to mechanical damage.

LIST OF REFERENCE NUMERALS

[0048] 1 sole structure
[0049] 2 upper
[0050] 3 wearing layer
[0051] 4 bottom layer
[0052] 5 upper layer
[0053] 6 stiffener plate
7 opening
8 tread surface
9 support projection
10 midline
11 medial edge of sole structure
12 cutoff
13 undersurface
14 side surface
15 side surface
16 side surface
17 side surface
18 side surface
19 side surface
20 front surface
21 rear surface
22 wearing layer
23 wearing layer
24 bottom layer
25 upper layer
26 side surface
33 wearing layer
34 bottom layer
35 upper layer
43 wearing layer
44 bottom layer
45 upper layer
46 stiffener plate
47 bore
48 tread surface
49 support projection
53 side surface

1. Footwear with an unstable sole structure configured for restoring and/or maintaining statically optimal body posture and healthy walking and running dynamics, for child and adult users, the footwear comprising an upper and a sole structure configured to conform to the physiology of a user’s normal rolling gait, wherein the sole structure is attached to the upper, and wherein the sole structure has a wearing layer adapted for contacting the ground, a bottom layer attached to the wearing layer, an upper layer attached to the bottom layer, and a stiffener plate arranged such that it contacts the upper layer, characterised by that a bottom layer covering the tread surface is attached to the upper layer such that the wearing layer extends at least over the side surfaces of the bottom layer, and an upper layer covering the tread surface is attached to the bottom layer, where the upper layer comprises a support projection adapted for preventing ankle pronation and dimensioned to at least match in size the print of an arch of a foot of the user, with the material of the bottom layer being more resilient than that of the upper layer, and with the stiffener plate contacting the upper layer being arranged such that it covers the tread surface and has a cross-sectional size decreasing towards the toes.

2. The footwear according to claim 1, characterised by that the largest length of the support projection equals at least the anatomic support point distance of the tread surface, that is, the distance between support points on the tread surface of the calcaneus and the bones of the hall of the foot, and the largest width of the support projection extends at least from the medial edge of the sole structure to the midline thereof, with the largest thickness of the support projection being 60-80%, of the largest thickness of the bottom layer.

3. The footwear according to claim 1, characterised by that at its end near the toes the support projection is connected with a smooth transition to the upper layer, and at the other end the support projection is terminated in a cutoff such that it does not cover the support point of the calcaneus on the tread surface.

4. The footwear according to claim 3, characterised by that an angle (α) between the cutoff and the midline of the sole structure is 18-35°.

5. The footwear according to claim 4, characterised by that the angle (α) between the cutoff and the midline of the sole structure is 21°.

6. The footwear according to claim 1, characterised by that the bottom layer and the upper layer are made from thermoplastic plastic.

7. The footwear according to claim 1, characterised by that the side surface of the bottom layer is arranged substantially perpendicularly to the tread surface and is connected stepwise to the wearing layer.

8. The footwear according to claim 1, characterised by that the side surface of the bottom layer is arranged at an acute angle (γ) with respect to the tread surface, with the side surface of the bottom layer being connected flush to the side surface of the wearing layer.

9. The footwear according to claim 1, characterised by that the wearing layer is set at an acute angle (β), preferably 83-87° with respect to the tread surface.

10. The footwear according to claim 1, characterised by that openings are disposed in the bottom layer.

11. Footwear with unstable sole structure configured for restoring and/or maintaining statically optimal body posture and healthy walking and running dynamics, for child and adult users, comprising an upper and a sole structure designed to conform to the physiology of normal rolling gait, where the sole structure is attached to the upper, and where the sole structure has a wearing layer adapted for contacting the ground, a bottom layer attached to the wearing layer, an upper layer attached to the bottom layer, and a stiffener plate arranged such that it contacts the upper layer, characterised by that a bottom layer covering the tread surface is attached to the wearing layer such that the wearing layer extends at least over the side surfaces of the bottom layer, and an upper layer covering the tread surface is attached to the bottom layer, where the upper layer comprises a support projection adapted for preventing ankle pronation and dimensioned to at least match in size the print of an arch of a foot of the user, with the material of the bottom layer being more resilient than that of the upper layer, and with the stiffener plate contacting the upper layer being arranged such that it covers the tread surface and has a cross-sectional size decreasing towards the toes.

12. The footwear according to claim 11, characterised by that the stiffener plate has a cross-sectional size decreasing towards the toes.

13. The footwear according to claim 11, characterised by that the cross section of the concave shape side surface has a circular arcuate boundary line.

14. The footwear according to claim 11, characterised by that the upper layer comprises lightening bores.

15. The footwear according to claim 2, characterised by that the largest thickness of the support projection is three-fourths, of the largest thickness of the bottom layer.

16. The footwear according to claim 6, characterised by that the bottom layer and the upper layer are made from polyurethane.