# Gait analysis essay



Gait Analysis BY Falafel Gait cycle analysis As mentioned before, gait cycle Is Just the activity that occurs between the time one foot touches a surface and the time the same foot makes contact with that surface again. In Dry.

Pedro Vera Ulna's book " Biometric; Inca De la march human normal y patrol; CIA", he describes it as " a series of alternating, rhythmic, limb and trunk movements which determine a forward displacement of the centre of gravity. In my opinion, it's a well rounded definition. The gait cycle is a key element in most of people's lives. It's what allows us to go from point A to point B and back again.

You might speed It up if you are happy or late for a meeting, and slow It down If you are dreading a lunch date with your In-laws or feeling sad. Hence, your emotions can change your walking pattern to a degree.

However, the elements that make up the gait cycle will be there all the same, no matter what. In it, we not only include our legs, we make use of all our limbs and trunk; posture, coordination and balance playing a key role in our stride. @We've talked long enough of the components which are the makeup of the gait cycle or stride, so what are they?

Well, the gait cycle can e delved Into two phases; the stance phase and the swing phase. Each one of these has components of their own, but we'll get to that in a minute. First, it's important to get down some basic concepts for better understanding later on.

When talking about a stride length, we are referring to the distance traveled during the gait cycle or stride. A step is half a stride; it begins when the heel of one foot touches the floor and end when the heel of the other foot does so. This distance is referred to as the step length. Remember running late for that meeting? This will Increase with your walking speed.

Respectively, when you are dragging yourself to that lunch with your in-laws, your step length will decrease.

However, regardless of your speed, in a normal stride your step length will remain the equal. Speaking of speed, here in clinical term land we call it cadence and it makes reference to the number of steps you take per minute. Lippies gives us an example of this. Feeling sad or down? Your walking speed will decrease and you might clock In at 70 steps per minute.

Likewise, if you are feeling happy or In a rush, your walking speed will Increase and with It your cadence, so you might be pushing the 103 steps per minute.

All this being said, It Is crucial to remember that speed will not change the components of a normal gait cycle. This is an important point to make since it can affect a gait analysis further down the road. @Now back to the two phases of the gait cycle.

In the stance phase, the foot remains in contact with the ground. Since It starts when the heel of the foot touches the ground and ends when that same foot leaves It, we can say that a step Is the core of the stance phase, which amounts to a 60% of the gait cycle, as Lippies expresses in his book " Clinical Sinology and Anatomy". Of course, the less time you penned on the ground, the more that percent decreases. With more speed comes less time of stance phase.

In other words the greater the cadence the shorter this period of time will become, and vice versa. There are five components that make the stance phase which will be later discussed. They are: heel-strike, foot flat, maintenance, heel- off, and toe-off contact with the ground. At this time, the other foot is ending its stance face and thus its toes are in contact with the ground.

This will later be referred to as double support.

Next, we have foot flat, when the body weight begins to shift to said leg and TTS entire foot makes contact with the ground. After this, the stance phase enters into maintenance, point at which the body passes over the body weight onto said leg (weight bearing). Here we have a period of single leg support, which will be mentioned later on.

Once maintenance is over, it's time for heel-off, when the heel rises off from the ground. Heel-off marks the beginning of the push off phase, a phase that takes place between stance and swing phase, giving propulsion to go into the swing phase.

After heel-off, the foot enters in toe-off, which signals the end of the stance phase and the SSH off. As its name says, is when the toes rise from the ground.

Unlike stance phase, in the swing phase is the foot doesn't make contact with the ground. This is the time when your foot is going forward, " https://assignbuster.com/gait-analysis-essay/

swinging" your leg to advance. It amounts to a 40% of the gait cycle, beginning when the toes of the foot leave the floor and ending when the heel of said foot makes ground contact again (starting its stance phase).

It has three components: acceleration, middling, and deceleration. Since the phases alternate from foot to foot, (when one is in the stance phase, the other is in he swing phase) is easy to relate to connect that dots and arrive to the conclusion that as you increase your speed, your swing phase's period of time will also increase. In other words, the greater the cadence, the greater percent of the gait cycle this phase will take.

In acceleration, the knee and hip of the leg are flexing, moving it forward and shorting it, so you don't drag your toes against the ground.

In middling, the ankle odoriferous bring it to a neutral position, preparing for the next and final part of the swing phase, which is the deceleration. This component prepares the foot o go into stance phase, ankle still in neutral position in order to successfully achieve that heel strike. However, no matter the differences between these phases, there are some elements that stand true to both of them alike.

These are: weight acceptance, single leg support, and leg advancement. One happens after the other. Weight acceptance, as its name suggests, happens in the first stages of stance phase, when the body weight begins to shift onto that leg.

After this, single leg support will kick in. This happens when the body weight is completely taken by the leg in the stance phase.

So, if one leg is in this phase, making contact with the ground, the other will be in swing phase, doing the exact opposite, thus leaving one leg to support our body weight, allowing the other to swing forward and advance. Hence, the last element is leg advancement, which occurs when the leg advances during the swing phase (to then return to stance phase). Is important to note that there are also periods of double support during the gait cycle, but this is not always the case.

There are also periods of nonsupport.

This might seem odd; after all, humans can't float or hover on thin air. Yet when we run, this happens, though it's too quick for us to notice or feel it. Nonsupport periods also happen while we Jump or skip. This and speed are the differences between walking and running.

Going back to double and single support, two periods of each occur in the gait cycle and take about 10% and 40% of it respectively. B? As mentioned before, your legs might be the power house and main body. Your arms swing as you walk or run. In a normal gait, you'll swing forward the arm opposite to the leg that's in swing phase.

In other word, if your left leg is in swinging forward, your right arm will be doing the same thing. This helps to create balance.

Your trunk will be rotating slightly along with that arm swing, and the hips will move up and down, going into a lateral pelvic tilt. This happens when we remove weight from the leg at toe-off, and there'll be a slight dip of the pelvis. To maintain a somewhat- leveled balance of the pelvis, the hip abductors muscles of the weight bearing leg and the erector spine muscles of the non-weight-bearing leg will work together.

The abductors will contract to prevent adduction of the pelvis and the erector spine will pull up to counteract the dip.

There are other things to keep in mind that determine the gait of an individual. There will be a vertical, as well as a horizontal displacement of the center of gravity, of about two inches each, as we walk. The width of our walking base (distance between the midpoint of heel contact on each foot) should range from two to four inches. For an excellent gait cycle, your head should be erect, shoulders leveled and trunk in extension.

All these elements are key when doing a gait cycle analysis.

In this process the movements during the gait cycle are recorded for further evaluation. After the data is analyzed, if necessary, a treatment plan can be made. There are different ways to execute said analysis. It will depend on resources and equipment and the purpose or goal of the analysis. This being said, no matter the goal, is best to view a person's gait cycle from different angles; side, front and back, since some elements of the stride are best seen in particular angles.

When it comes to actually analyzing someone's gait, you can kick it old school.

All you'll need is: a stop watch to clock in the cadence (steps per minute), a notepad and pen to write down some notes and observations, and measuring tape, to get the step length, stride length and width of walking base. On https://assignbuster.com/gait-analysis-essay/ average, a typical gait analysis lab will be equipped with many video cameras and infrared ones, all placed around a catwalk or treadmill which are all connected to a computer. Some markers will be placed on the client or patient in key points or landmarks.

The person will then walk in the treadmill or catwalk while the computer calculates the trajectory of each marker in AD.

A model is applied to calculate the bone's movements. With this, we obtain a full breakdown of each Joint. To detect the activity and the contribution of individual muscles in movement, it's necessary to investigate the electrical activity of them. Many laboratories also use electrodes adhered to the skin to detect the electric activity or dynamic electromyography (MEG) of the desired muscles.

At the present time, one of the most used methods is the combination of torque platforms for kinetic videocassette techniques for kinematics, together with registration systems of dynamic MEG.

As with everything, there's a margin of error with this and other gait analysis methods. An article in the Biomedical Engineering magazine of SEC University in Colombia points them out; "The placement of markers is a critical point a considerable source of error in the parameters" -said when peaking of the Davis protocol of marker placement which uses as anatomical reference points bony prominences such as the accordion-?" it has been reported that this placement of markers is less precise, because each has independent movement relative to the bone. ".

All in all, if you find yourself suspecting off problem in your Perambulated cleverly stated in an article in Housework's; a website owned by the Discovery company: " Consider the need for a gait analysis like you would a problem with the tires on your car. If your car was out of alignment and wearing out your tires o quickly, you wouldn't Just keep buying new sets of tires; you would get the alignment fixed so the tires performed normally. Likewise, you would take your car to someone who knows how your car is supposed to work and how to fix it. Why would you do anything less for your body? Pathology Not all noted changes in someone's stride are a signs of an underlying pathology. Age can change a person's walking pattern. Your children have a wider width of walking base, faster cadence, their stride length is shorter, initial contact with the floor is made with foot flat not heel strike, their knees are mostly extended in stance phase ND there's little reciprocal arm swing.

On the other hand, elderly adults spend more time in stance phase and double support periods, take shorter steps and the width of their walking base is not as wide. Lippies) Now that's been clarified, an abnormal gait can be caused by many things, and it may be temporary or permanent. Some abnormal gaits may be due to pain, neurological involvement, a limitation in the range of motion, a discrepancy in the length of the leg or muscle weakness or paralysis. As said before, this paper focuses on the Anatolia gait, which falls under the pain group. Anatolia means " against pain".

An Anatolia gait makes itself present when the person is trying to avoid putting weight on a leg due to pain.

You have probably experienced this before, be it by a sprained ankle or when you sit in an awkward position for a while and lose sensation on your leg, getting that pins and needles feeling. Notice that when either of this happens, a person tends to limp; avoiding weight bearing on the affected leg, thus the gait cycle is affected. Stance phase of the affected leg is shortened; the stride is also shortened on that side, successfully messing with the person's posture sine now they'll tend to lean to one did (the healthy leg) more than the other, to avoid pain.

The upper extremities will also try to compensate in the arm swing; it will be shortened as well, might be exaggerated, and often abducted.

Like the saying goes, " it takes two to tango', whatever happens with the lower extremities, the upper ones will try to adjust and compensate to it, and vice versa. This change in the gait can come suddenly, like when you sprain your ankle, or gradually due to a disease or damage to a nerve or the musculoskeletal system. It can also range from mild to severe and from temporary to permanent. It will all depend on the underlying cause of the Anatolia tit and the extension of the damage.

Anyone at any age can, and probably will, suffer from Anatolia gait at some point in their lives.

This being said, the elderly and athletes are more prone to it. When looking for causes of this abnormal gait, the list can be extensive. From an ankle sprain to storytelling, from leg cramps to arthritis or gout, from peripheral enumerator to Join or limb deformity and everything in between; all of these are Just some of the causes for Anatolia gait. Others include but aren't https://assignbuster.com/gait-analysis-essay/ limited to: a tumor, bone fracture, trauma to hip, knee, foot, ankle or leg,

useless or tendon injury and so on.