

Canine Gait Assessment and Conformation

This subject is one of the most important for you to understand and master as a massage therapist. Each animal's structure has developed over the course of history to perform a set of functions that will, hopefully, keep that species alive and thriving until the end of time. Structure and function go hand-in-hand and should always complement each other. Unfortunately, bad breeding leads to a bad gene pool. Poor conformation can affect gaiting patterns, negatively, preventing the animal from living up to their true potential. Poor breeding, diet, repetitive physical stress, surgeries, accidents, poor environment and poor social conditions can also affect the animal's gait and conformation for the better or worse.

Compounding this problem is interbreeding, in a species, which totally distorts the conformation and, thereby, the gait of the animal.

We should assess the animal's conformation before we massage, or exercise, an animal. We need to have a thorough knowledge of the animal's anatomical structure. Different breeds of dogs have different structures. The structure of the dog

affects the gaiting pattern of the dog. Each breed of dog was bred to have a desired function. You will be coming into contact with many types of mixed breed animals. Mixed breed dogs will be some of the hardest animals to assess. For mixed breed dogs, we will have to find a middle ground for assessment of conformation and gait analysis. If possible, I suggest that you read the following books before doing any assessment:

1. [The Dog In Action](#) by McDowell Lyon
2. [An Eye For A Dog](#) by Robert W. Cole
3. [Dog Locomotion and Gait Analysis](#) by Curtis M Brown.
4. [Dog Steps](#) by Rachel Paige Elliot
5. [What's Your Angle](#) by Helen Grinnel King

Please watch and study the gaits on [this](#) site and watch the [Dog Steps](#) video. The Dog Steps video should be watched more than once. I have watched this video over 30 times and I still get more information from it each time I watch it. If you don't have the time, money or desire to read the above books, then I hope I can give you enough information in this document to help you do a good assessment.

Equipment

Here is what you will need to do a good assessment.

1. A video camera. You can use your phone camera or iPad camera. The best camera to use would be a POV camera. Point of view cameras will give you a good recording of what you are seeing and you can follow the dog closely during the gait analysis portion of the assessment. Two good POV cameras are [Pivothead](#) and [GoPro](#). Pivothead is the least expensive solution and is a true point of view camera that is mounted on an eyeglass frame. GoPro is more expensive and you would have to mount the camera to your chest or a headband.
2. A long flat area to walk the dog on such as football field, a long sidewalk or an empty street. The time of day will be important in the summer or in hot climates. Don't walk a dog on a hot surface in the summer. Try to make sure you have a quiet time of day when there won't be a lot of people and animals around that could be distracting for the dog.
3. A leash and a correction collar (choke chain) or slip leash.

4. A clipboard, writing implement, iPad or any other electronic device that you can use .
5. You should get a [Chuckit](#) and some tennis balls or a Frisbee. Getting the dog to fetch things will get them tired and allow you to film them in playful action. A dog that is tired will also start to show signs of any underlying problems that might not be observable when they are well rested.
6. Some high quality natural treats.
7. A full set of intake forms, especially the [gait and conformation checklist](#).

Observation and Assessment of Conformation

We should look at the animal standing and view the animal from all angles taking pictures as we go around so that we can have a record. Pose the dog in a stacked position so that you can check their conformation. Checking the conformation will give a clear picture of any structural deformities.

This is what I do to get a good stacked picture. Two people are needed and a camera that can do burst mode (take several pictures with one click). Regardless of the size of the dog, I want the photo taken on-level with the shoulder and upper thigh.

My breed (Border Collies), average about 18-20 inches in height, so my photographer (Gail) is sitting on a very low stool or on the ground. Gail is also positioned with the camera aimed at the middle of the rib cage so that at no time is the picture taken at an angle.

At first, I will semi stack the dog holding the leash up with collar behind the ears. I will then toss food, or toy, about a foot in front of the dog as I want to get the dog to lean and arch the neck a bit. I then count to three while the dog is looking, intently, at the tossed object; then give the release word to get it. I do this several times as this helps the dog to be keen on leaning into the stack for the tossed object. Don't worry if the dog moves feet at first. You are merely prepping the dog to be motivated to lean into the stack and not resist the tautness of the leash.

Once this is accomplished, I stack the dog (for real) making sure that the front legs are straight down and the rear legs have the hock straight down to the ground. No "rocking horse" stance, meaning that neither the front nor rear should be over extended. I always line up the front legs before the rear legs. The photographer should have the perfect picture of what the stack looks like, from the side, and then tell you which leg needs to be adjusted. What the camera sees is

what you will get; which is why it is important for the photographer to know what they are looking at and be in the right position. The preceding excerpt was written by Janice DeMello of *Hob Nob Border Collies* and was taken from *What's Your Angle* by Helen Grinnell King. There are quite a few dog show stacking videos that might be helpful for you to learn.

1. [No Fuss Stack](#)
2. [Free Stack](#)
3. [The Ultimate Dog Stacker](#)

Palpation

After we have the pictures we need, we should palpate the dogs body to assess whether the dog is loading both sides equally and from front to back. Palpate to see whether the muscles on either cranial limb are equal in size and carrying an equal amount of tension. Palpate the caudal limb muscles as well. Palpate the gluteal muscles on either side. Look at the pads of the feet to see if they are too thin. Check the nails to make sure the nails are not too long. Nails that are too long will affect the gait, will put stress on the phalanges and can cause knuckling. When you are palpating the dogs muscles, look for hot and cold spots as well. Cold spots indicate a lack of blood circulation to

the area. Abnormally hot areas indicate inflammation. Inflammation can be caused by tissue damage, overuse of the joint, overuse of muscles or an infection of some sort. Look for pain signals during palpation as well. If the dog pulls away from your touch or tenses their muscles when you are palpating an area, they most likely have some pain in that area. The pain could be acute or chronic. Acute pain will be more sensitive to touch and very hot. Chronic pain will be less sensitive than acute pain and hot in a wider area. The dog can react to a pain memory as well. Dogs and humans will pull away from someone trying to touch an area of their body that has experienced a lot of pain before. This guarding and withdrawal response can affect the dog's structure as much as an acute pain withdrawal response. Note what you find on your SOAP chart and intake forms.

Examining the Gait

We now show the animal's caretaker how to walk the dog correctly. Not many people know how to have a dog heel correctly. Many dogs take their caretakers for a walk instead of being taken for a walk. Teaching the dog to heel, in my opinion, is the only training that is necessary for the normal dog. You notice how I say normal dogs. Many dogs

have behavioral issues and need a professional to work with them to help them correct the undesirable behavior. A well socialized, unabashed, dog only needs to learn how to walk on a leash correctly. "Sit" and "stay" will normally only work if another dog or a squirrel is not around. I will post a video here in the future on the correct way to walk with a dog on a leash. Unless you are a dog trainer and have the time to teach someone how to walk their dog correctly, you will need a quick and efficient way to get dogs to walk correctly with their caretakers. Most of the videos on YouTube, on teaching a dog to heel, are not good and involve too many training steps. Small, frightened dogs are the hardest dogs to walk on a lease. It is best to let the caretaker walk naturally with small frightened dogs.

Have the caretaker walk the dog on a flat surface. Follow the dog, from behind, and film the caudal end of the dog. Stay far enough away from the dog so that you can see the entire top line of the dog and the cranial and caudal limbs as they move.

When you have enough footage of the dog moving away from you, have the caretaker walk the dog to you as you move backwards. When you have enough footage, have the caretaker continue walking while you film the left and the right sides of the dog as you follow the dog on each side.

When you have enough footage, watch the dog a few more times (without recording) and note what you are seeing, with the naked eye, on your gait and conformation chart.

Palpation Of Muscles and Bones

When palpating the muscles that are bearing the shifted weight, we will see more tension and bigger muscles. This will be especially noticeable in lateral weight redistribution in the left and right cranial and caudal limbs. During palpation of the muscles, you might find that the incorrectly positioned joint will have swelling and pain that is associated with the inflammatory process. You might also hear or feel clicking when you move the joint through its ROM (range of motion). Check out each joints range of motion when you are palpating the body. We can discover weaknesses through palpation that can help us to determine where to do massage on the affected muscles and joints. The art of massage comes from the therapists ability to assess which muscles are tight and which muscles are weak. We do this through palpation and observation.

Examining Your Conformation Findings

Now you will have to load the pictures onto your computer. First take a look at the conformation pictures and place colored dots on the best picture at the following locations.

1. The top of the dorsal end of the spine of the scapula.
2. The point of the shoulder.
3. The tip of the olecranon process of the ulna.
4. The cranial superior iliac spine of the hip bone.
5. The base of the tail.
6. The lateral border of the ischial tuberosity.
7. The cranial border of the stifle joint.
8. The point of the hock.

You can place the dots, on the pictures, with a software program like [Pixelmator](#) for Mac or Photoshop for Mac or Windows. You can also print a picture and mark the dogs directly on a picture. After you have marked the angles on the dog, you will have to ascertain what the correct angulation of the limbs is for the six classes of dogs. A 45 degree layback of the spine of the scapula is normal for most breeds and a 30 degree angle of the croup is normal for most breeds. A flat croup, or to steep croup, would interfere with the flexion or extension of the thigh. In breeds that need more strength for pulling, you might find a flat or steep

croup. Long angles are built for speed, medium angles for endurance and short angles for strength. When we talk about and measure angulation we are looking at the cranial limbs, caudal limbs and the angle of the pelvis. We should look at the length of the coupling, the entire top line of the back, the set of the head and the slope of the neck as well. There are a six basic types of dogs.

1. Sporting dogs. (rangers, springers and retrievers)
2. Sporting Hounds (scent trailers, gaze trailers and dogs that go to ground)
3. Gazehounds
4. Terriers
5. Working dogs
6. Toy dogs

Each of these six classes of dogs should conform to a breed standard and has one of four basic types of body structures.

1. Low center of gravity
2. Terrier fronts
3. Normal galloper
4. Double suspension galloper

We should look to the various breed standards, for each dog, to find out what the correct angulations should be for the breed of dog you are assessing.

For mixed breed dogs, we will have to find a happy medium angulation. You will find some good information on correct angulation [here](#). The best book to read is Curtis Browns, *Dog Locomotion and Gait Analysis*. Curtis Browns book is very technical and precise and is a must read for anyone who really wants to know more about canine gait and conformation.

With mixed breed animals, we will have to look at what dominant breeds are mixed into the dog. Let's take a look at the bulldog as an example. We would do a search online and come up with what looks like the best site to work with. One of the best sites for the Standard English Bulldog is [here](#). This is what you are looking for in each breed. Not every breed standard is so well kept, so you will have to do a lot of searching and/or go to the Google images page for that breed. If we were to look at the Rottweiler, we would find that we are not given as many well laid out pictures as the Standard Bulldog site. Here are a few links as examples (<http://en.wikipedia.org/wiki/Rottweiler>), (<http://www.a-love-of-rottweilers.com/rottweiler-breed-standard.html>), (<http://www.akc.org/breeds/rottweiler/index.cfm>).

****Be sure to chart all of your conformation findings.**

Examining the Gait Findings

You should already have a set of field notes to go from. You will now load the video you captured in the field into your computer. Watch the video a few times, at regular speed, and compare what you see on the video to your field notes. Slow the video down and freeze frame sections that seem irregular to you. Make notes of your observations and make sure to note the timeline section where you are observing these regularities. Make sure to store your findings, and all of your charts, in a folder that you have made for this dog. Later, you will want to go back to this material to see if your work has positively affected the gait and conformation of the dog. Lack of observable changes will let you know that you need to change your therapeutic methods. Positive observable changes will let you know you are on the right track. These videos can be a strong marketing tool as well. They say, "The proof is in the pudding" and people love to see that there is progress. Many times people forget what the dog looked like when they were not moving correctly or when their conformation was not correct. Having a video and picture file is very helpful in many ways.

In your *Dog Anatomy Coloring books*, pay particular attention to Plates 24, 36, 37, 38 and 41 when doing the assessment. Keep these plates in mind when you watch the [Dog Steps](#) video as well. I have given you a [document](#) that will help you to know what muscles are working during the abnormal gaiting and conformation patterns. A great software application to get is [Dog Anatomy Canine 3D](#). This application will also help you when you are studying canine acupuncture point location. There are several YouTube canine anatomy dissection recordings from Texas Tech at [this link](#) that can help you to learn anatomy as well. If you do an internet search for canine dissections you will find other videos as well. [Millers Anatomy of the Dog](#) is the classic canine anatomy book for most veterinary students and is a great resource to have on hand. I have an ebook version of this text. I suggest that you get ebooks as much as possible because they are light weight and are handy resources to have when working in the field. You will have to study the definitions of the different actions of muscles, thoroughly, and learn the normal range of motion of each joint. You will study these things in the animal anatomy section of this course and in your *Anatomy and Physiology for Veterinarian Technicians* textbook. Knowing which muscles are causing faulty gait

irregularities will take some time and practice to understand. Knowing the causes of poor gait patterns can be hard to determine. We should first look to see if there is a structural deformity that might be causing poor gait. If the structure is sound, then we should determine if the animal has had an injury that contributed to this poor gait pattern.

Charting What We Observe

Once we have looked at the dogs conformation, we should chart any abnormalities on our [ventral](#) and [dorsal](#) SOAP charts for future reference. We should also mark and notate what we see on our [gait and conformation chart](#). When viewing the gaiting patterns, take poor conformation into consideration when you see gaiting irregularities. Gait and conformation assessment skills come from a lifetime of observation. Every animal you look at should be a subject for you to improve your observation skills. As your observation skills improve, you will be able to tell which joints are being affected by poor conformation and gaiting irregularities. You will be able to detect where the dog is feeling pain. This will help you to alleviate that pain quickly through massage, stretching, hydrotherapy and therapeutic exercise.

Results Of Poor Gait and Poor Conformation

When an animal's conformation is off balance, the load that is placed on each joint will have varying degrees of abnormal loading on the joints.

Abnormal wear on the joint, its bursa, cartilage, meniscus, ligaments and joint capsule will occur. Pain will set in as damage to the joints occurs. The dog will start to pull away from the pain by altering the amount of load that they put on the joint. This, in turn, will put an abnormal load on an opposing joint. When the dog attempts to unload the joint by putting their head down to shift weight, to the front from an injured caudal limb, we will see this in the gait. Dogs that walk with a low head set will be shifting weight onto the cranial limbs in order to avoid pain in the hips or caudal limbs. This dog will eventually end up with joint pain in the elbow and shoulders as well. A tight muscle will prevent a joint from going through its full R.O.M. (range of motion) and a weak muscle will fail to hold the body and joints in proper alignment during movement of the joints.

Making A Treatment Plan

The next step is to determine what muscles are causing any of the gaiting irregularities that you are seeing. Make sure to chart your findings in your SOAP notes. Once we have assessed the conformation and gait to determine what imbalances are present, and why these imbalances exist, we can give [stretching](#), [strengthening](#) and [balance exercises](#) for the client to do at home to help prevent damage to a joint or structure. Make a [treatment plan](#) on how to loosen the tight muscles and strengthen the weak muscles. Use the strengthening and balance exercises, along with the stretching you will learn in class, to help the dog to get back into the best balance that they can accommodate. If the structure they are given is handicapped from birth, then the best you can do is to relieve some of the pain that they are experiencing. Try not to overwhelm animals that have poor structural conformation. They will get too sore and you can cause more damage to the joints from over stretching and over exercise. Dogs with genetic structural anomalies have learned to adapt to these irregularities. Trying to correct these irregularities will throw the adaptive alignment out. Dogs that have had surgical appliances and restraints placed to their ROM should be treated with caution as well. Concentrate on pain relief and treating the

opposing joints and muscles that are now taking the load due to the dogs weight shifting away from the trauma. Also remember that post surgically, the dog will always be shifting away from the area that had the surgery and overloading the opposing structures. In acute massage treatments, concentrate on the opposing structures with massage and stretching. Once the dog has healed sufficiently from the surgery, you can start to massage the area around the surgery and do joint range of motion exercises after the surgeon has given the approval.

The canine rehab cards will help you figure out what the best exercises are to do with the dog. The strengthening and balance exercises links are big files, so they will take a long time to load if you have a slow internet connection. If you want to use these cards professionally, then buy the cards directly from [Canine Rehab Products](#). They will allow you to copy the cards to distribute to your clients. Always have the client check with their DVM to make sure that the exercises and stretching are not going to hurt their dog. The client can show the card, that you give them, to the vet and the vet can fill in the amount of repetitions, duration and intervals for each suggested activity. If the client doesn't want to go to the vet, then make sure the client understands

that "less is more" in the beginning of any exercise regime. Build up slowly so that the animal doesn't get sore or injured. If the animal is limping the next day, or doesn't want to load a joint, then have the client back off on the amount of exercises and stretches until the animal is rested and healed up again.

Sometimes water exercises are best for animals that are rehabbing from surgery or who are elderly. The buoyancy of water helps to take load off of the joints. A word of caution; in California, and in some other states, the veterinary boards are going after "swim therapists" or "aquatic therapists". The veterinary boards are getting too many complaints about lack of sanitary conditions as well as animals coming home with all kinds of skin diseases. Swim therapies, when done correctly and in sanitary conditions, can work wonders with elderly animals and animals that are recovering from injuries. The vets want to see Animal Physical Therapists doing this work in most states. I have had many past students who have taken a [water therapy](#) course and love doing the work. I have not heard of any of them getting into trouble yet. The [IAAMB](#) also has an [Association of Canine Water Therapy](#) you might want to check out. Swim therapy is very popular right now, so please become familiar with it. If you

don't want to do swim therapy yourself, then have a reliable person to refer your clients to. An animal physical therapy clinic would be the best place to refer your clients to.

Causative Factors of Gaiting and Conformation Irregularities

Some of the causative factors are:

1. Car accidents
2. Surgery
3. Poor handling
4. Injuries from sporting events, playing or hiking
5. Over exercising
6. Under exercised
7. Dog fights
8. Poor genetics
9. Abuse by humans

This is obviously not a complete list, but it is enough to see that you will have to do a thorough examination to determine what causative factors have contributed to the irregularities you are observing.

Some other causes of gait irregularities are:

1. Padding, pounding, crabbing or short stilted action to avoid interference between front and back legs. If the body is too short, the stride too long or the timing is off the dog will have to sidestep and run like a crab.
2. A dog with its head down consistently is probably shifting weight off of the hind quarters due to an injury there. If head is heavy, lowering it will move the center line of gravity forward. This dog will also show some injury at some point to the carpals or shoulder joint due to the increased weight and pounding placed on the front assembly.
3. Elbowing out can be caused by a thickening of the subscapular muscles which push out the superior border of the scapula.
4. If the cranial limb foot pads are not under the center of gravity, the pastern and pad will take a beating wherever the dog stands, strides or steps. If the pad is behind the center line of gravity, the pastern will be too straight to set it under the correct weight bearing point. The weight will be carried on the toes or digits rather than on the heel of the pad. The foot may break down and flatten out or the pastern will go down below the angle at which its natural structure is intended to be. In the case of a pad that is in front of the center line of gravity, the heel will have a tendency to roll backward thereby putting weight on the sesamoid bone; at the same time throwing the navicular bone out.

5. The croup should be at a 30 degree angle. A flat croup or steep croup would interfere with the flexion or extension of the thigh. You might find a flat or steep croup in breeds that need more strength for pulling.
6. A sway back could be caused by improper angulation of vertebra or weak ligaments and muscles.
7. A flat croup may indicate weak loin muscles.
8. A camel back starts at the withers versus the roach back which starts at the loin and is caused by improper angulation of the lumbar vertebra.
9. A 45 degree layback of the spine of the scapula is best to prevent padding and pounding.
10. Single tracking is not necessarily a fault. It brings support at the center line of gravity and also brings more speed.
11. Cow hocks can be useful for dogs who pull sleds or other weight but is a fault in most dogs.
12. There are more injuries of the front assembly than the rear assembly. This is due to the level of impact as the body moves through the center line of gravity and the weight of the body & head shift forward onto the front support. Most of the thrust comes from the rear assembly and the shift of the bodies weight is absorbed by the front assembly.

Generally, a tight muscle will pull the bones out of line and will also weaken the opposing muscle. The opposing muscle will have to work against the tight muscle and will become weak. We want to stretch the muscle that has been shortened, from

overuse, and strengthen the opposing muscle. Both should be done to bring the structure back into balance. Looking at your own body will affirm this. If you overwork one side of your body, the muscles will become bigger and tighter and will pull or twist you to one side and bend you backwards or forwards. If you don't stretch the muscle, you will remain distorted. If you do stretch the muscle and fascia, but fail to pull the body back into alignment through strengthening the opposite muscles, you won't be able to maintain the new alignment achieved through stretching.