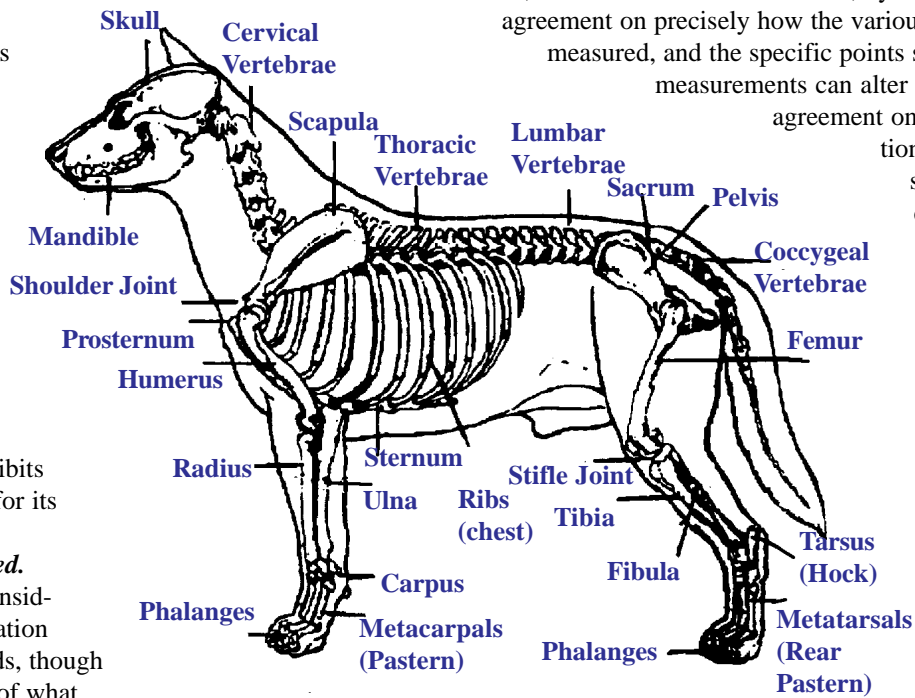


According to Spira¹, angulation is probably one of the most frequently used (and often misused) terms among dog fanciers.

Angulation refers to the angles formed by bones meeting at various joints (articulations), especially at the shoulder, stifle, and hock; the pastern and pelvic regions may also be involved. In general the terms *forequarters angulation* and *hindquarters angulation* are used to describe the combined joint angles of these regions. A dog that exhibits the proper joint angles for its breed is said to be *well-angulated* or *well-turned*.

Variations in what is considered to be proper angulation occur between the breeds, though there is a commonality of what constitutes good angulation for most breeds if the individual dog is to move with ease and grace. If a dog's forequarters angulation generally matches his hindquarters angulation he will be said to be *in balance* even if both front and rear angles are less than the ideal for his breed.



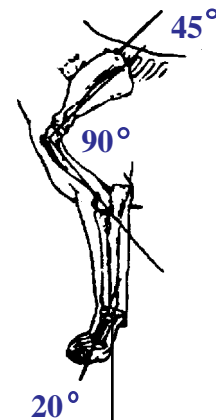
A dog that is in balance will usually move better and have greater stamina than a dog with greater angulation, front or rear, that is not balanced. There is, by no means, common agreement on precisely how the various joint angles should be measured, and the specific points selected for these measurements can alter the results. Nor is there agreement on what degree of angulation constitutes the ideal standard for the generic dog, that is, the dog that will move most fluidly, with speed and stamina.

In particular, the so-called shoulder layback angle measured along the spine of the scapula (shoulder blade) from the vertical is often considered ideal at 45 degrees (Spira¹, Lyon²). This is hotly disputed by Elliott³ who considers the 45 degree angle to be extreme and notes that such an angle

would bring the lower end of the scapula so far forward as to lose the support of the chest wall. Elliott prefers an angle more like 60 degrees as expressing the normal ideal for most breeds.

A common method for evaluating the slant of the bones in the forequarters is to take a line from the uppermost edge of the scapula to the frontmost prominence of the humerus (the point of shoulder), then take another line from there to the elbow. As a general rule, the distance between these points of reference should look or feel about equal, and if the front is balanced the elbow will be set approximately on a line dropped from the rearmost angle of the scapula. Another way to measure this angle is to feel the ridge of the scapula, and to determine the angle between this ridge and the slant of the humerus (measured from its upper center to its lowest end (not the elbow)). These latter measurements differ from the first procedure and will give the impression of less shoulder layback and a greater angle between shoulder and humerus, but the findings are more realistic as to the actual bone placement and joint angulation. The nominal ideal for this angle is 90 degrees, however, most breeds will be found to measure closer to 105 degrees, and terrier breeds in particular will probably measure at more than 130

degrees. The angle the pastern makes with the vertical should be about 20 degrees in most breeds, a greater slope indicating weak pasterns (down in pasterns).



**Forequarters
(Thoracic Limb)**

¹ Spira, Harold R., *Canine Terminology*, Howell Book House, Inc., New York, 1982

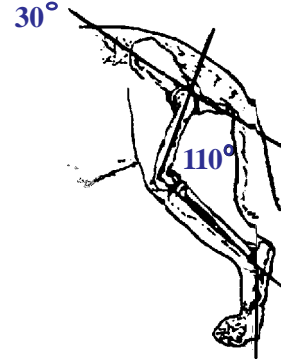
² Lyon, McDowell, *The Dog in Action*, Howell Book House, Inc., New York, 1985

³ Elliot, Rachel Page, *The New Dogsteps*, Howell Book House, Inc., New York, 1983

CANINE TERMINOLOGY - Angulation

(Continued)

Most standards suggest angles within the range of 90 to 110 degrees for the hindquarters angulation to bring it in line with the forequarters angulation. The rear angle (the stifle joint angle) is measured along the longitudinal axes of the femur (thigh bone) and the tibia/fibula (lower thigh bones). In practice, most stifle angles vary from 110 to 130 degrees with the Chow Chow as the major variant at 150 degrees¹. A reference to hindquarter angulation sometimes also includes the angle of the pelvis from the horizontal (the pelvic slope). Length and slope of the pelvic assembly can be approximated by taking a line from the forward edge of the pelvis (ilium) to the buttock (ischium). Pelvic slope and outline of the croup are not one and the same. While the outline of the croup and set-on of the tail may be influenced by the slant of the pelvis, the outline may be more affected by the arch, dip or straightness of the lumbar section of the spinal column. The angle between the lower thigh and the rear pastern (the hock joint) is also significant. The rear pastern should drop vertically, however, if the hock angle is too great (straight in hock), the rear pastern will slope backwards, and if the hock angle is too small (sickle hocks), it causes the dog to “stand under itself”.



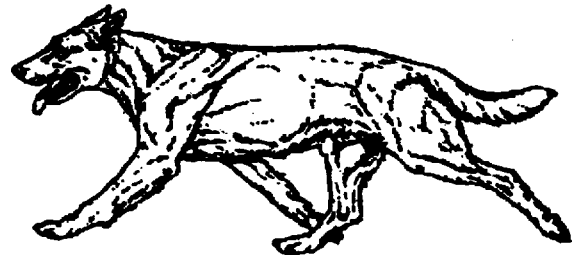
*Hindquarters
(Pelvic Limb)*

CANINE TERMINOLOGY - GAIT

3rd in a series - compiled by J. Seltzer

The term *gait* means the pattern of footsteps at various rates of speed, each pattern distinguished by a particular rhythm and footfall. The *walk*, *trot* and *gallop* are the most commonly recognized gaits, but the *amble*, *pace*, and *canter* are also normal ways in which many quadrupeds move. The principal gait in the show ring is the trot, and when a judge requests an exhibitor to "Gait your dog," he means the dog is to be led at a trot across the ring in a prescribed pattern.

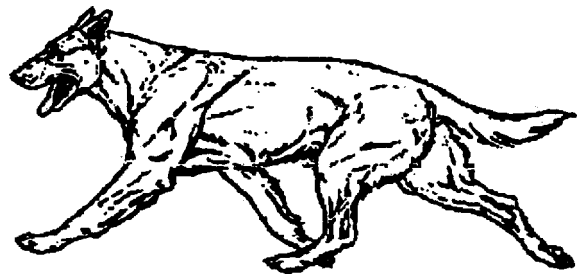
The *trot* is a rhythmic two-beat, diagonal gait in which the feet at diagonal ends of the body strike the ground together. Because only two feet are touching the ground at a time, the dog must rely on forward momentum for balance. At a normal trot, when the weight is transferred from one pair of legs to the other, there is an almost imperceptible period of suspension as the body is propelled forward. Some people call this spring.



The Trot

The *suspension*, or *flying trot*, is a fast gait in which the forward thrust contributes to a longer and more obvious period of flight during each half stride. Because of the long reach, the hind feet actually step beyond the imprint on the ground left by the front foot. But the suspension, combined with coordination and good foot timing, is important to avoid interference.

The *pace* is a two-beat lateral gait in which the legs on each side move back and forth exactly as a pair causing a rolling motion of the dog's body. Structure and proportion (as well as fatigue) influence a dog's inclination to pace. The gait is typical of a few large breeds, but is frowned upon in the show ring. Pacing is sometimes called side-wheeling.



The Pace

The *amble* is also a type of gait in which the front and hind legs on the same side move in unison with each other as a pair. The amble is similar to the pace in all respects except that it is slower, and, while in the pace both feet on the same side hit the ground simultaneously, in the amble the rear foot of the pair is raised off the ground just a fraction sooner than the front foot, and the rear foot is also brought into ground contact a little earlier. The amble can also be described as a fast rocking walk which is often seen as a transition movement between the walk and faster gaits. As a transition movement it should not be confused with pacing.

The fastest movement of the dog, the *gallop*, is a four-time gait in which the dog is fully suspended or airborne once during each motion sequence. The actual movement pattern is: right front foot, left front foot, right rear foot, left rear foot. Suspension occurs immediately after taking off from the left rear foot. According to Stonehenge¹: "Perfection of the gallop depends upon the power of extending the shoulders and

forelegs as far as possible, as well as bringing the hind legs rapidly forward to give the propulsive stroke. If the hindquarters are good and well-brought into action, while the shoulders do not thrust the forelegs well forward, the action is labored and slow. On the contrary, if the shoulders do their duty, but the hind legs are not brought well forward, or do not thrust the body onwards with sufficient force, the action may be elegant, but it is not powerful and rapid. For these purposes, therefore, we require good shoulders, good thighs, a good back, and, lastly, for lodging the lungs and heart, whose actions are essential for the maintenance of speed, a well-formed and capacious chest"



The Gallop

¹"Stonehenge," *The Dogs of the British Islands*, Second Edition, London, 1872, p 180.

Elliott, Rachel Page, *The New Dogsteps*, Second Edition, Howell Book House, New York, 1983.

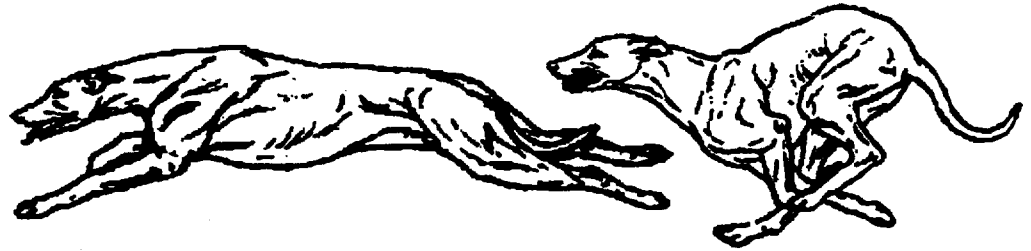
Spira, Harold R., *Canine Terminology*, First Edition, Howell Book House, New York, 1982.

CANINE TERMINOLOGY - GAIT

Continued

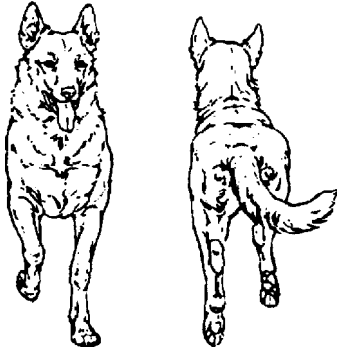
The gallop of the Greyhound and several of the other sight hounds differs from that of most other dogs in that it consists of a series of gigantic leaps, leaving the dog totally airborne for considerable periods of time, twice during the sequence of motion. This type of motion is referred to as the *double suspension gallop*.

The *canter* is a term not generally used to describe canine movement. It is basically a slow form of gallop, and not as tiring. It has three beats per stride, two legs move separately and two as a diagonal pair. Canter-ing is sometimes referred to as the *collected gallop* or the *lope*.



The Double Suspension Gallop

The *walk* seems so uncomplicated there is no need to analyze it other than to draw contrast with the faster gaits. It is the least tiring and the slowest of all gaits: a four-time gait with each limb moving one after the other. At the walk three legs support the body at all times, each foot lifting from the ground one at a time in a given sequence: right hind, right front, left hind, left front.



Straight - Normal

The **normal gait**, as viewed from the front, should be a free, effortless, easy gait without physical contact between individual members. The legs should be carried straight forward from the point of last pad contact to the next one, and the back legs should follow in the same angled plane. Watching the dog move away from you should also show a straight column of bones - from hip socket to pad. The rear leg will angle inward toward the center line as the speed increases, moving in the same plane as the front leg.

This inward angling, called **single tracking** is normal in canine gait. The tendency is for the legs to incline more and more under the body as the speed increases. Eventually, the paws, as seen by their imprints, come to travel in a single line.



Single Tracking

Correct single tracking requires that the column of bones from shoulder to pad remains in a straight line and should be distinguished from **moving close**, either front, back, or both. When moving close, the fore or hind limbs are insufficiently well separated from each other during movement, and, in extreme cases the legs may interfere by brushing up against one another along their inner borders.



**Out at Elbows
Paddling**



Toeing-Out



**Weaving, Crossing Over,
Plaiting, Dishing or Toeing-In**



**Bandy, Moving
Wide in Front**

There are many possible deviations from normal gait caused either by poor conformation or conditioning. Any deviation from the straight-line column of bones during the entire swing of the limb is a fault. The most commonly seen are among those illustrated here. **Crossing over** is an abnormality of gait in which the feet when extended cross over in front of one another as well as over an imaginary center line drawn under the body. **Paddling** is incorrect and energy wasting movement of the forequarters in which the pasterns and feet perform circular, exaggerated motion, turning or flicking outwards at the end of each step. When **toeing-in** the forefeet are rotated towards each other and the center line instead of being in direct continuation with the line of the pastern. **Toeing-out** involves the opposite rotation of the forefeet. **Weaving**, also called **crossing over, dishing, plaiting, knitting and purling**, occurs when, in front or hind quarter motion, the free foot at first swings around the support foot and then forward and inward, eventually crossing the latter's path before being set down on the ground. Frequently a clever handler can conceal **cow hocks or bow hocks** by deft manipulation when stacking a dog. These structural faults are revealed however, when the dog is being gaited.

References:

Spira, Harold R., *Canine Terminology*, First Edition, Howell Book House, New York, 1982

Nicholas, Anna Katherine, *The Nicholas Guide to Dog Judging*, Third edition, Howell Book House, New York, 1989



Close Behind



Cow-Hocked

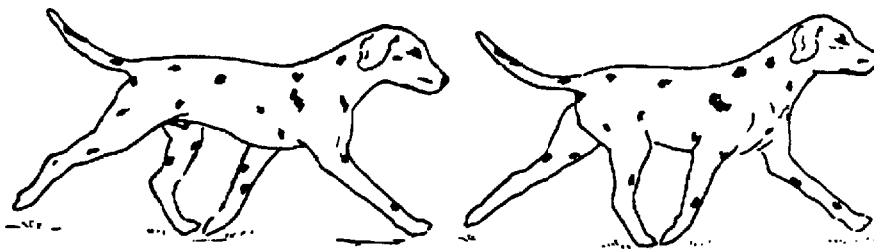


**Bow-Hocked, Bandy,
Moving Wide Behind**

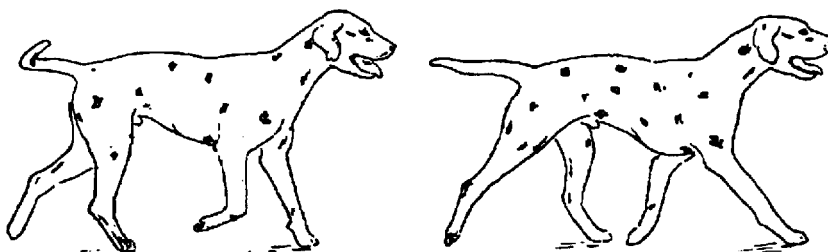
Crabbing or sidewinding is faulty forward movement in which the spinal column is not pointed in the direction of travel, rather, it deviates at an angle so that one rear leg passes on the inside of the front foot, while the other does so on the outside of its partner, instead of traveling in a straight line with them.

Front and rear views (covered in the previous article) probably show us more action faults than side views, but the side views show us the blending of front and rear actions for smooth, graceful passage. The foundation of gait is evident in the front and rear views, and the beauty is revealed by the side view. Two other important factors can be better observed from the side: the flexing of the legs and the supporting action of the pastern under weight, which is often revealed by the bobbing rather than level movement of the withers.

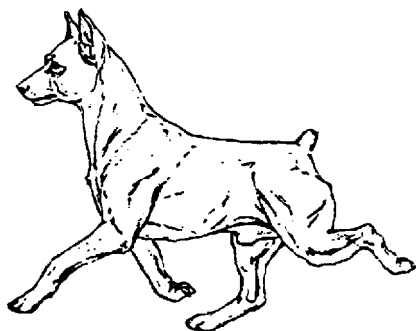
In some dogs, easily detected in a faulty Dalmatian, excessive rolling of the torso caused by too wide a gait, loose shoulders, or general lack of soundness can be observed in the side view as the spots along the topline disappear from view and reappear again with each stride.



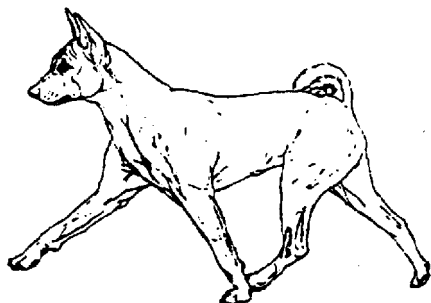
Good Angulation facilitates a long stride. Balance facilitates good foot timing.



Poor Angulation shortens stride because the bones meeting at the shoulder joint and hip are steeply set, forming joints with wide angles.



Hackney Gait. Correct for a Miniature Pinscher but generally faulty.



Goose-stepping Basenji. Faulty in any breed.

The importance of angulation cannot be overemphasized when evaluating gait. The most significant angles are at the shoulder and hip joints. These joints counterbalance one another as they lift, open and shut with the swing of the limbs. The front of the dog normally carries about 60% of the total body weight and works like a shock-absorbing mechanism as it coordinates with drive from the rear and absorbs impact with the ground. Lack of angulation or stiffness at the pastern restricts the shock absorption and exacerbates the pounding. Whether viewed from the side or from front or rear, the action should be smooth and harmonious with no twisting or jerking. Problems arise when one part has to overwork or compensate for lack of balance, injury or weakness in another. It is important to note that excessive angulation in any part of a dog's body is detrimental to joint support and endurance. It is never a question of the more angulation the better - it is a matter of just how much is needed for functional efficiency.

A dog with good angulation and balance will have joints that flex easily and smoothly, providing strong thrust from the rear and spring and resilience in the front. Dogs with poor angulation must take shorter steps, and more of them, to get where they are going. Their action is bouncing rather than smooth. A dog that is straight, front and rear, has a short, stilted gait, but, if in balance, may be better off than a dog lacking balance, where one end has to compensate for the faultiness of the other.

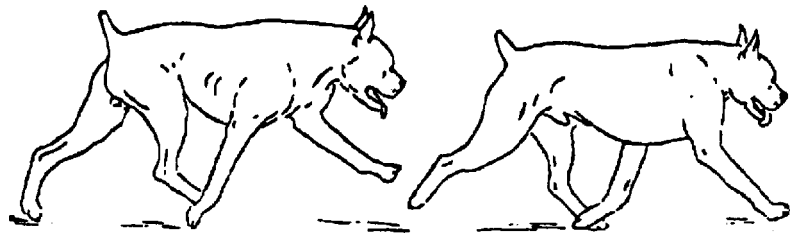
Hackney action as a fault is caused by more angulation and drive from behind than in front. The dog resorts to extra high action of the forelegs in order to keep the paws out of the way of the oncoming back feet. The term is taken from the hackney horse which exemplifies this action. Although specifically requested in some breeds standards, e.g., Miniature Pinscher, hackneying is an abnormal movement that requires rather steep shoulder angulation, coupled with upright pasterns.

References:

- Elliott, Rachel Page, *The New Dogsteps*, Second Edition, Howell Book House, New York, 1983.
Nicholas, Anna Katherine, *The Nicholas Guide to Dog Judging*, Third Edition, Howell Book House, New York, 1989.
Spira, Harold R., *Canine Terminology*, First Edition, Howell Book House, New York, 1982.

Goose-stepping is a movement typified by accentuated lift of the forelimbs, similar in most respects to a hackney gait, but coupled with full extension of the front pasterns and feet before placing them in contact with the ground. The dog seems to have good reach, but close observation will reveal that the actual front foot contact with the ground is delayed, and therefore the effective reach is considerably shorter.

Overreaching at the trot is a common fault, caused by more angulation and drive from behind than in the front, so that the rear feet are forced to step to one side of the front feet to avoid interference or clipping. This is one of the many forms of poor foot timing, but it must not be confused with the natural overreach in the suspension trot, or in the canter or gallop. Overreaching is a common fault in puppies as they develop through “leggy” stages when the height at withers may exceed length from buttocks to shoulder joint by a fractional difference. As the puppy develops and the body proportions come into balance, the overreaching ceases.



Over-reaching Boxer. Observable in profile and especially when moving fast, in which the hind feet are thrust past their front counterparts.