

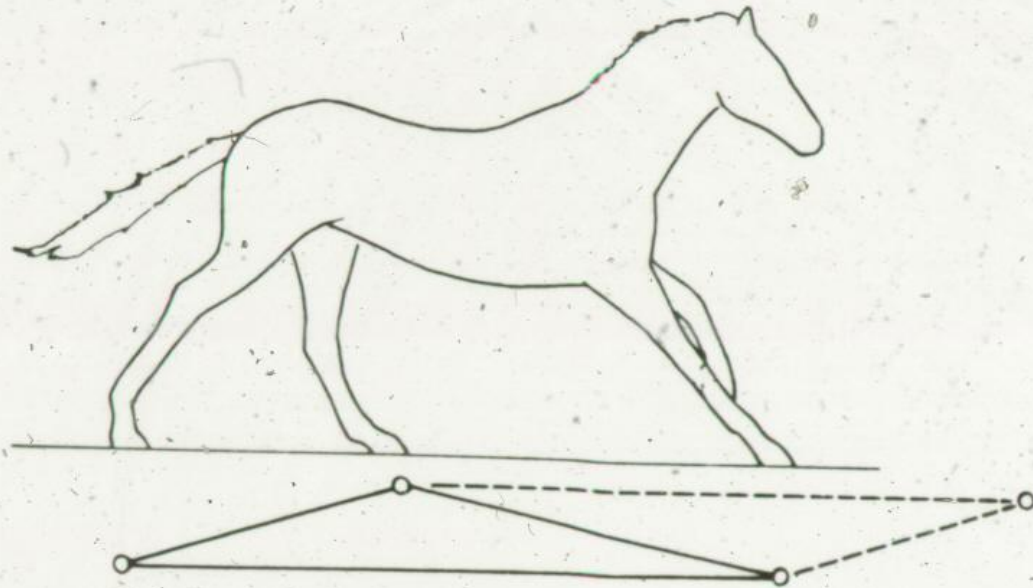


**Stuart S. Sumida / Kathleen Devlin  
Biology 342**

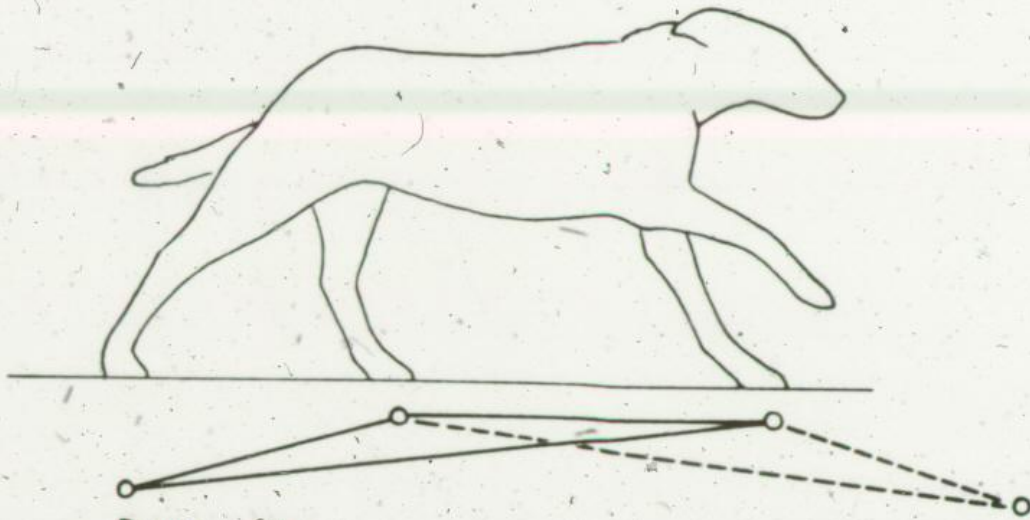
# **Locomotion: High Speed Gaits in Mammalian Carnivores**

# ROTARY GALLOP

- In four-legged mammals, the highest speed gait is the gallop. It is a four-beat gait, with each limb contacting independent of the other three.
- In carnivores, the gallop usually has a double suspension, or floating phase, with the limbs gathered underneath in one, and extended forward and back in the other.
- The footfall sequence tends to be: right hind, left hind, left front, right front. (Or left hind, right hind, right front, left front.)

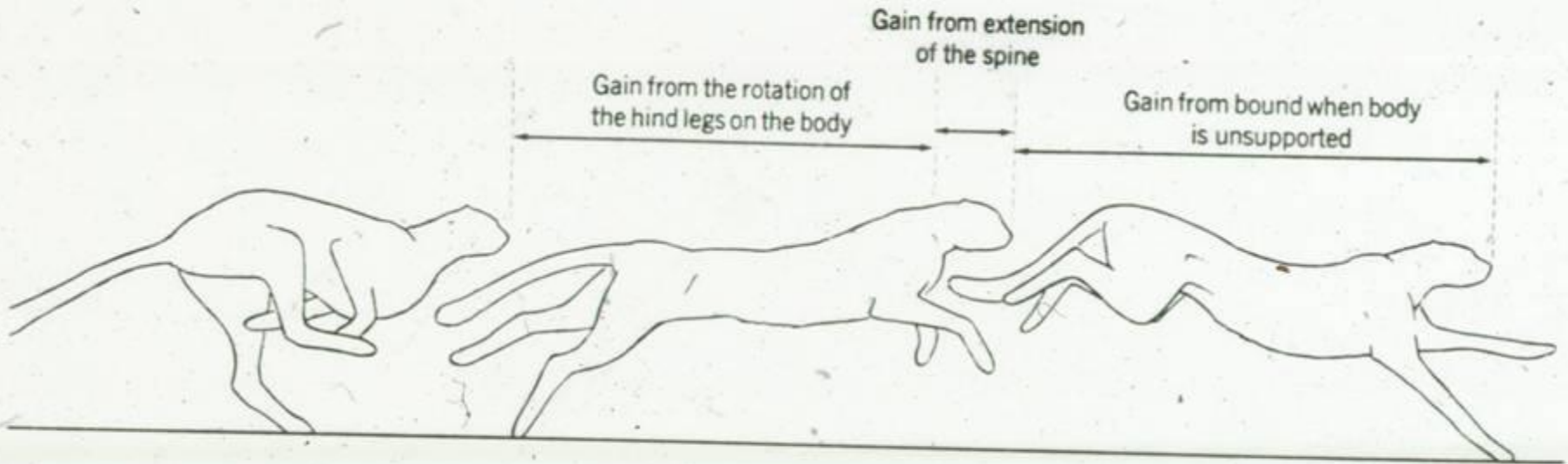


Transverse gallop



Rotary gallop





Gain from the rotation of the hind legs on the body

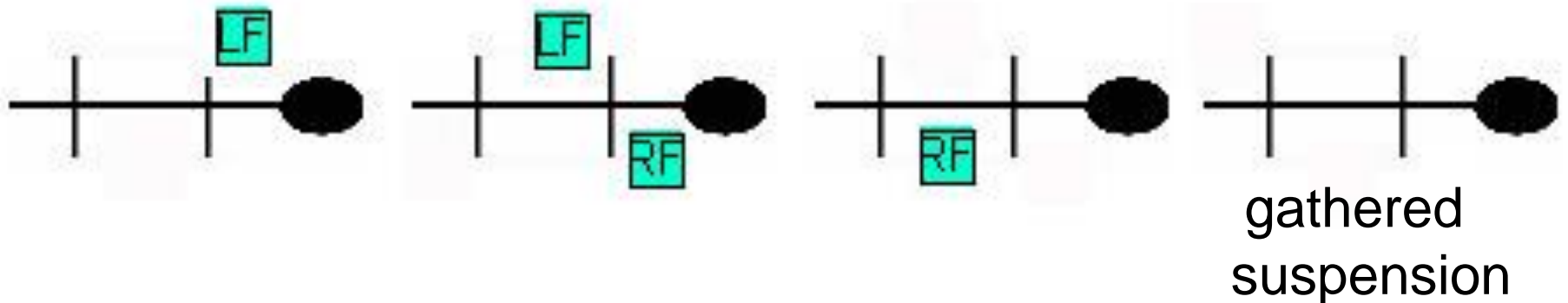
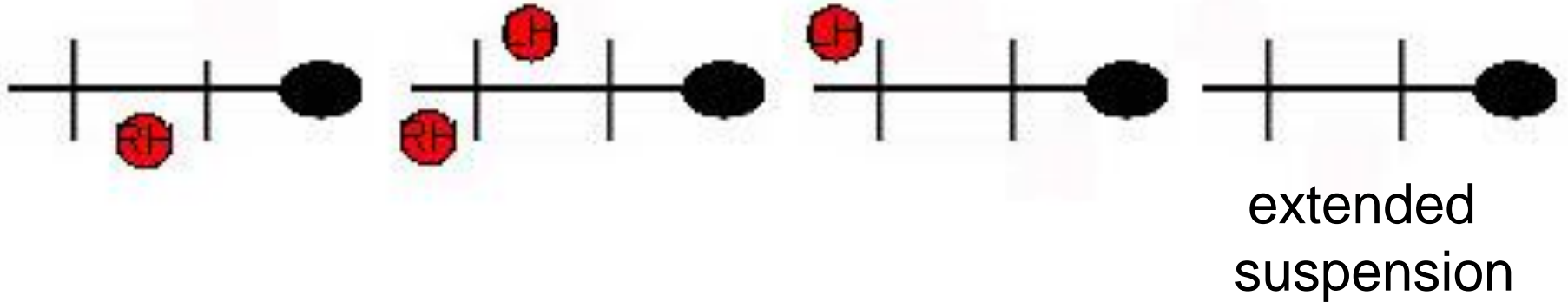
Gain from extension of the spine

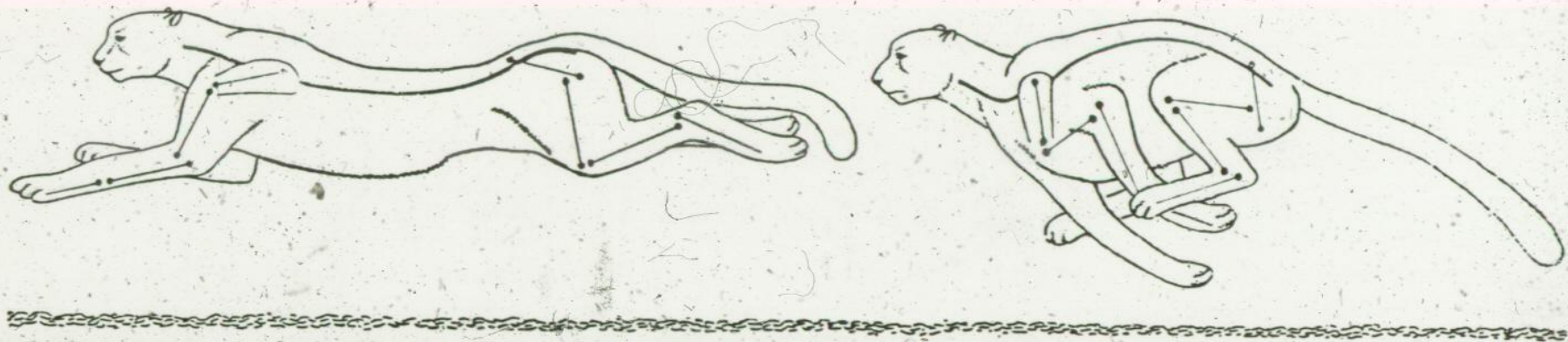
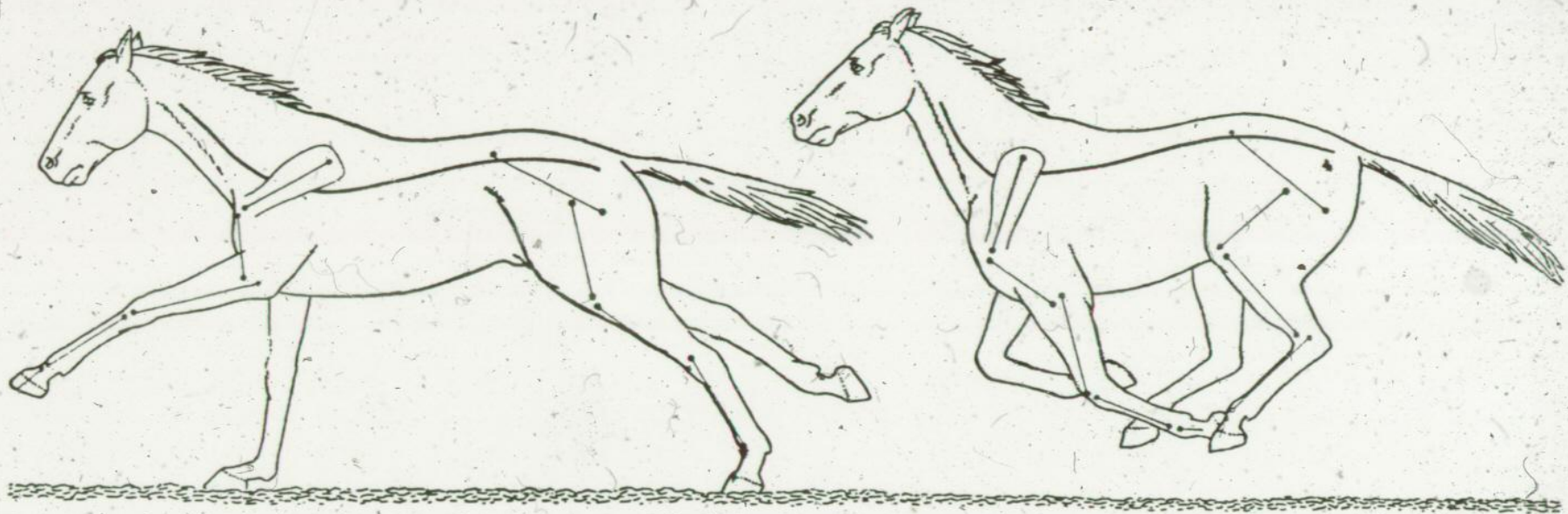
Gain from bound when body is unsupported



# GALLOP

- In carnivores, the gallop usually has a double suspension, or a floating phase with the limbs both gathered underneath as well as extended forward and back.
- The footfall sequence tends to be: right hind, left hind, left, front, right front.  
(Or left hind, right hind, right front, left front.)





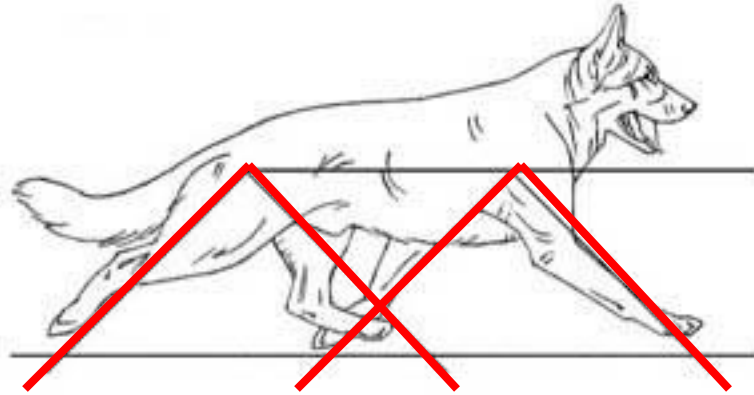
**GALLOP** - In lightly built (usually carnivores) mammals such as dogs, the gallop is a four-beat gait.

In the example below: rotatory gallop - right hind, left hind, (extended suspension), left front, right front, (gathered suspension).





# GALLOP compared to a TROT

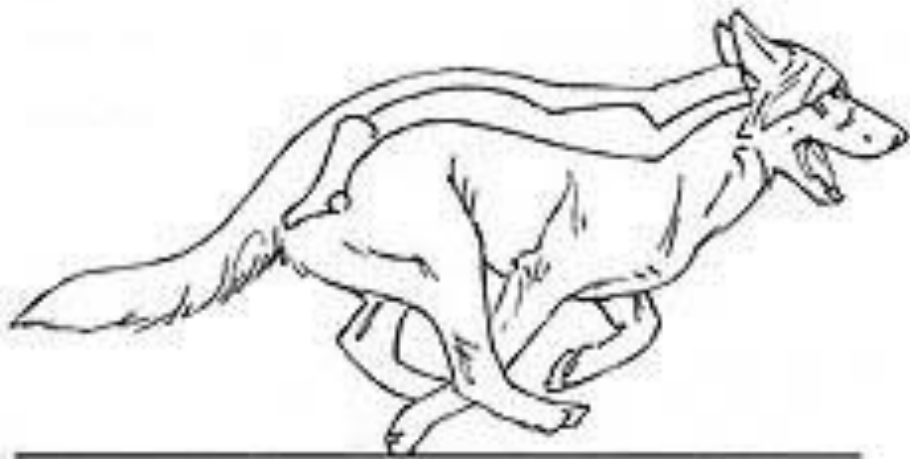
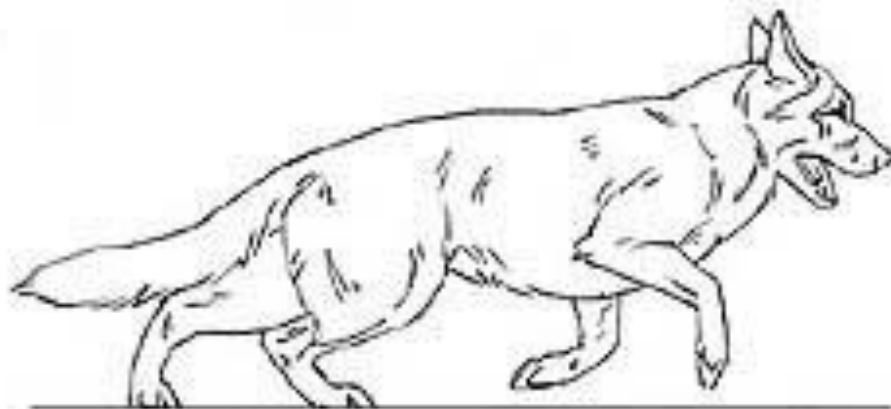
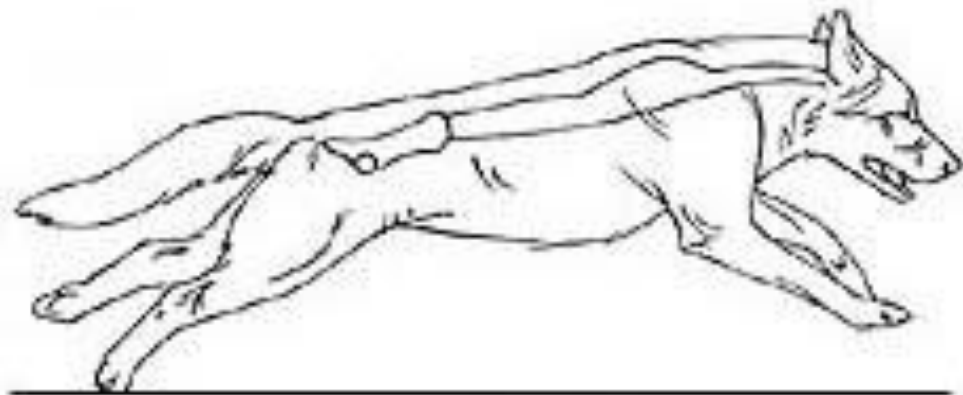


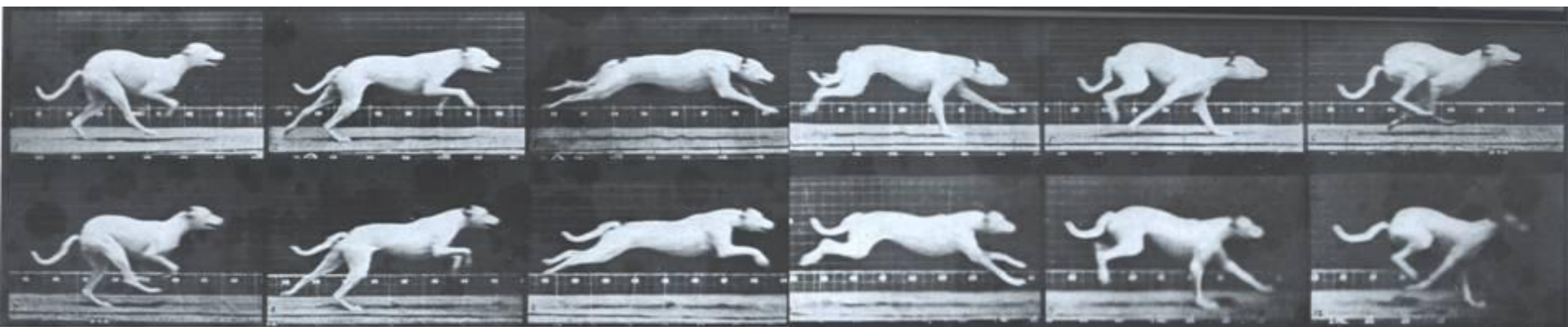
Note that in a trot, the fore- and hind limbs appear as complimentary angles.



Whereas in a gallop, the forelimbs are almost **PARALLEL** to the **ground** at some point.

# Gallop





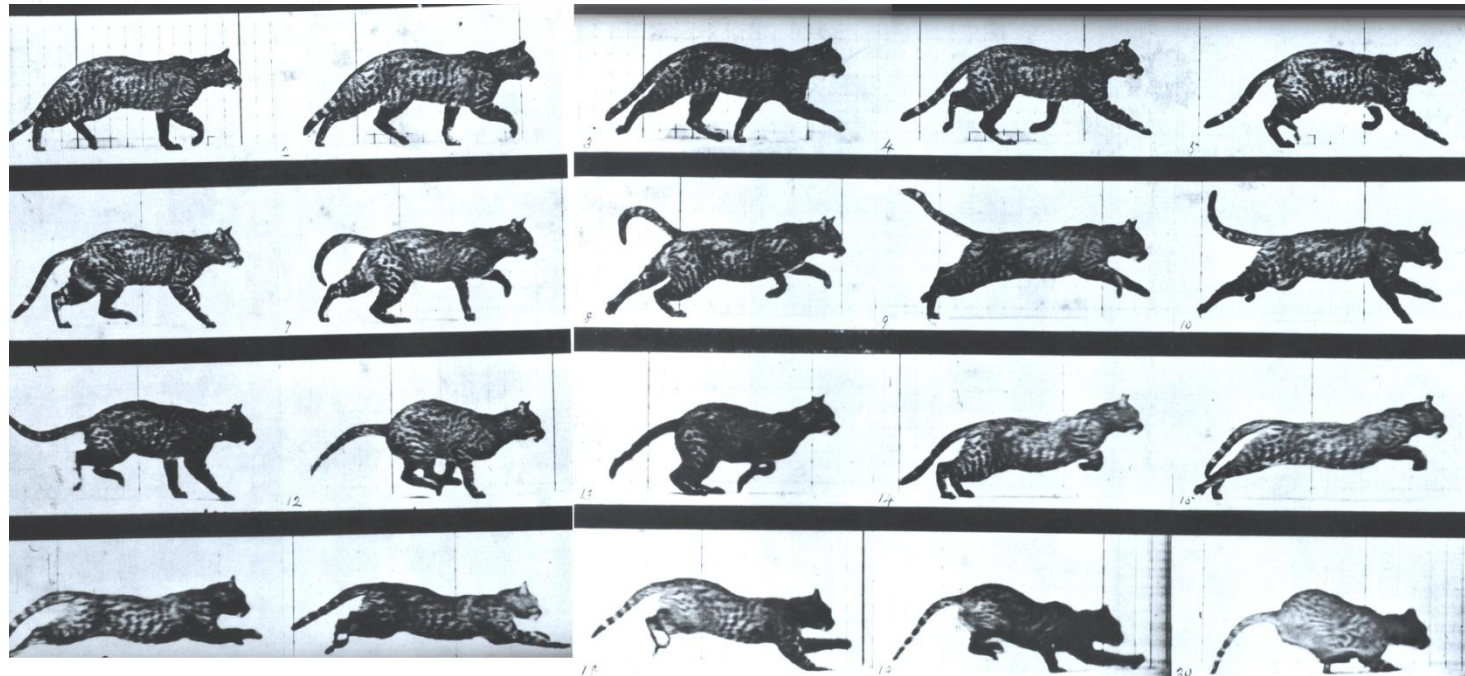
At pushoff, the hind limb is almost straight.



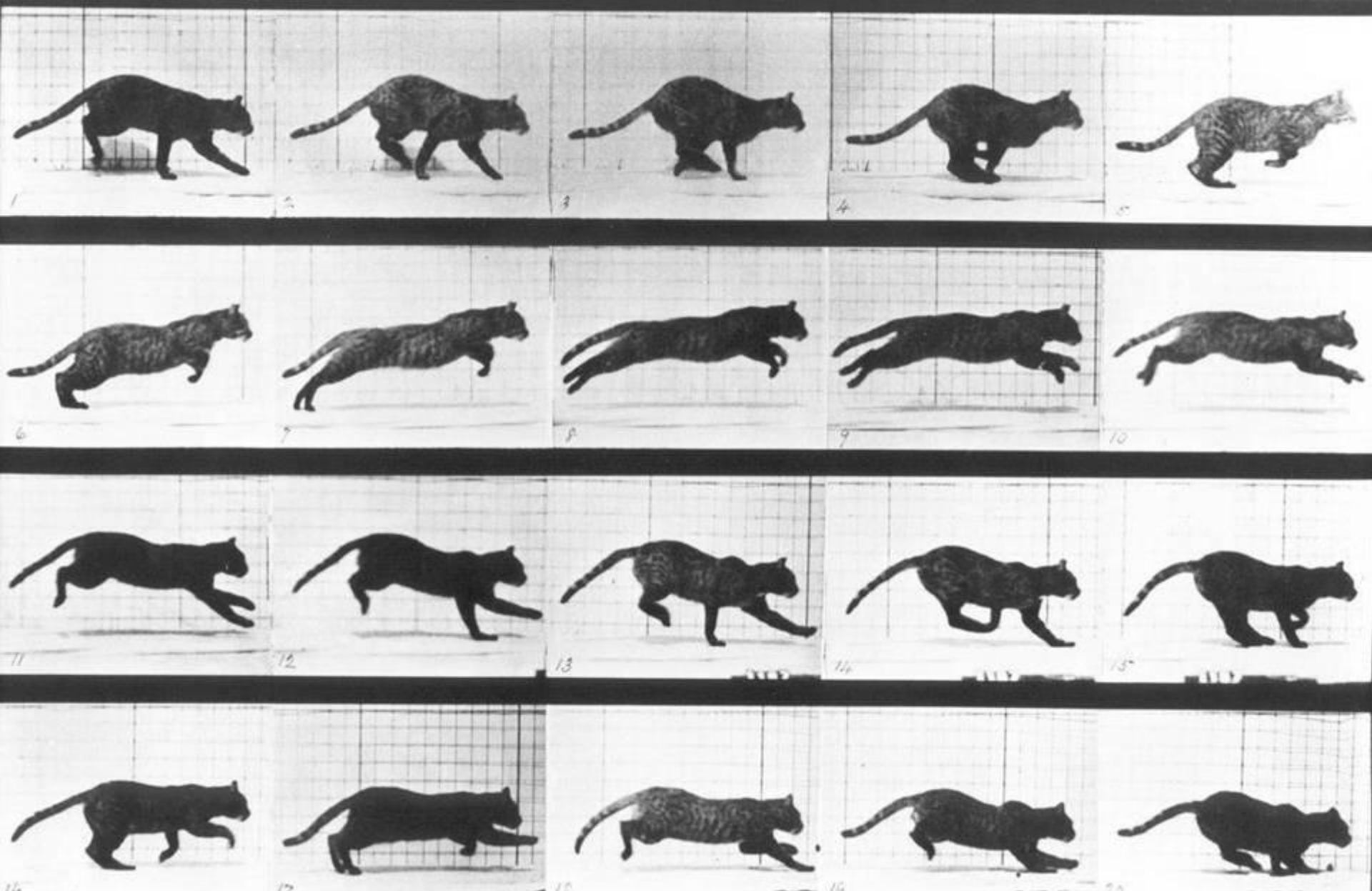
# GALLOP

- In lightly built (usually carnivores) mammals such as dogs, the gallop is a four-beat gait.

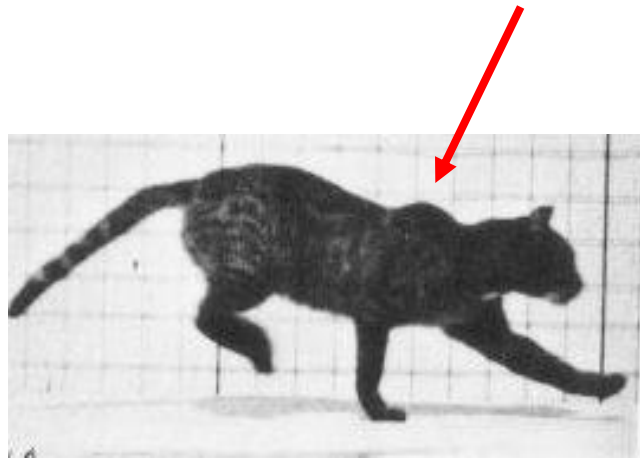
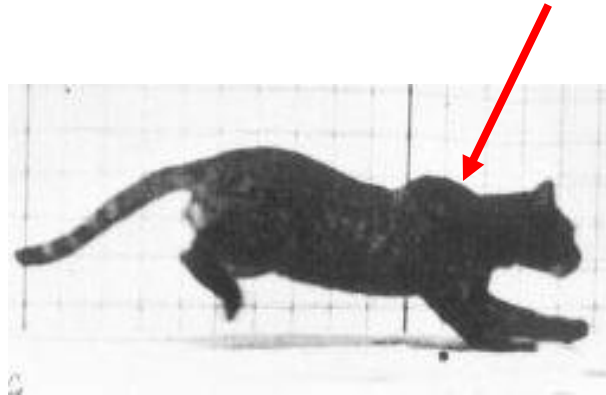
Although both of them show flexibility of backbone, flexibility is greater in cat.



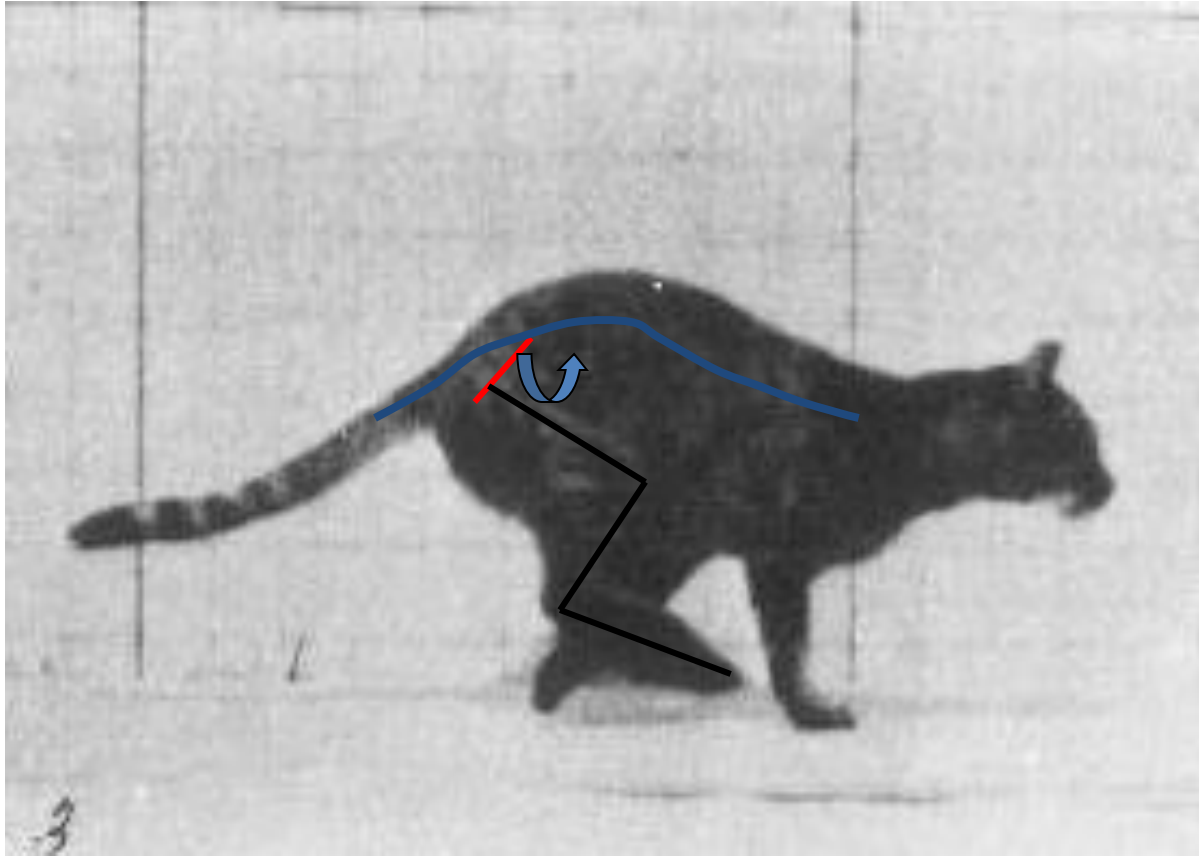




Cats often have greater duty-factor than dogs while running.

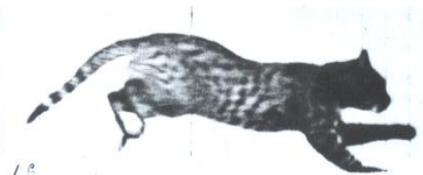


Cat scapula will show prominently, especially when weight is placed on the forelimb. This happens in all gaits, but is particularly prominent when galloping.



Recall that both cats and dogs have elongate hands (“digitigrade” condition).

Note that when galloping, the more flexible cat can place the entire hand on the substrate whereas only the digits make contact in dogs.



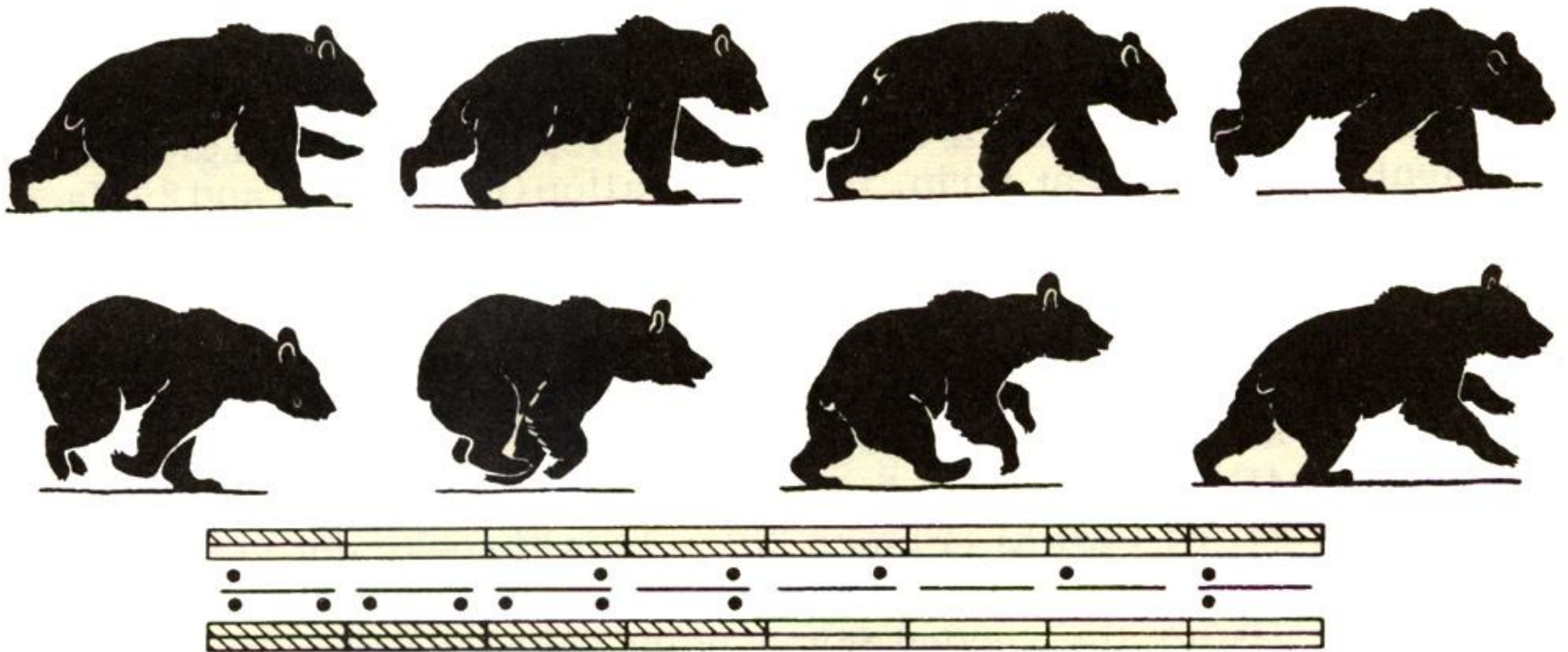


## Heavy Carnivores:

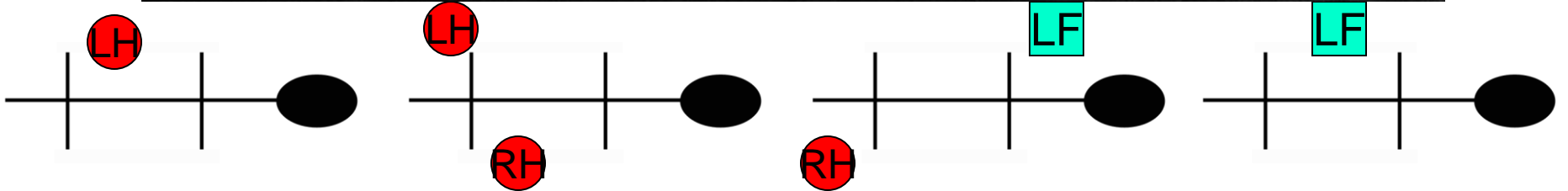
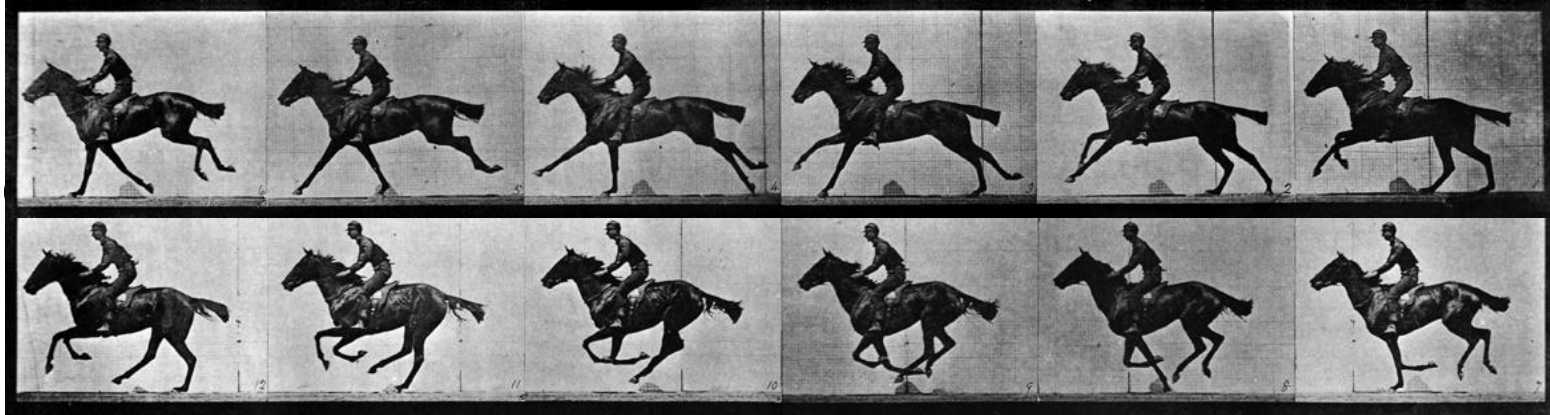
Bears have a moderately flexible back, but not so much as a high speed carnivore.



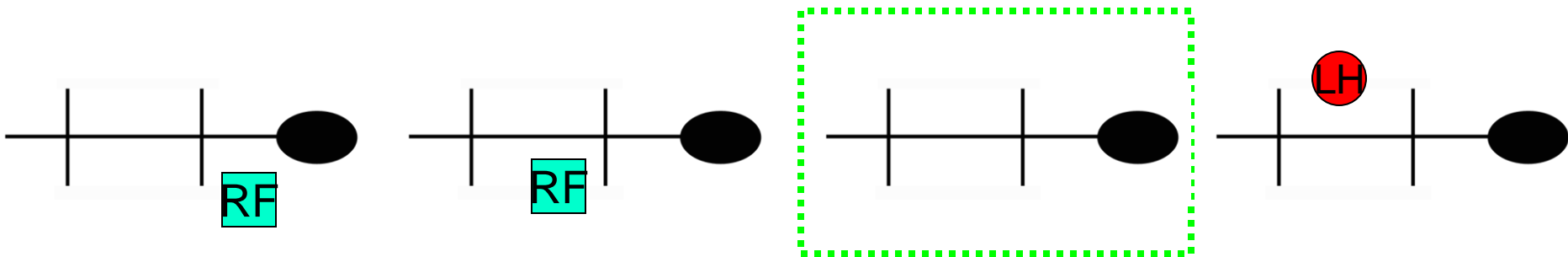


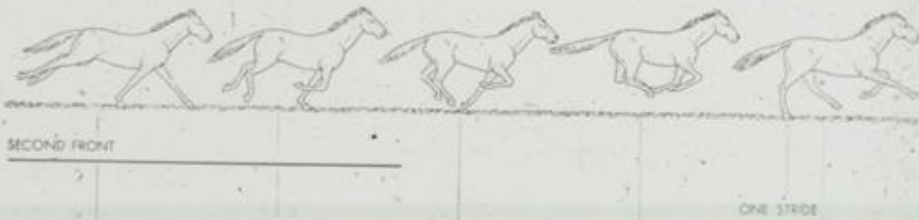


Bear in [slow] rotary gallop



Equine Transverse Gallop with **GATHERED** floating phase.





TIME (SECONDS)

1

2

3

4