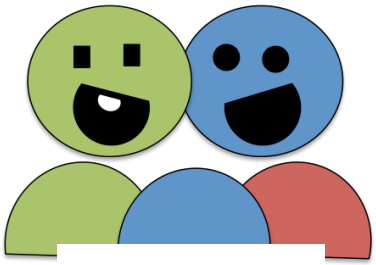
**Today:**
**Free-body diagrams and Systems Schema**
**Newton's 3rd Law**
**Normal force**

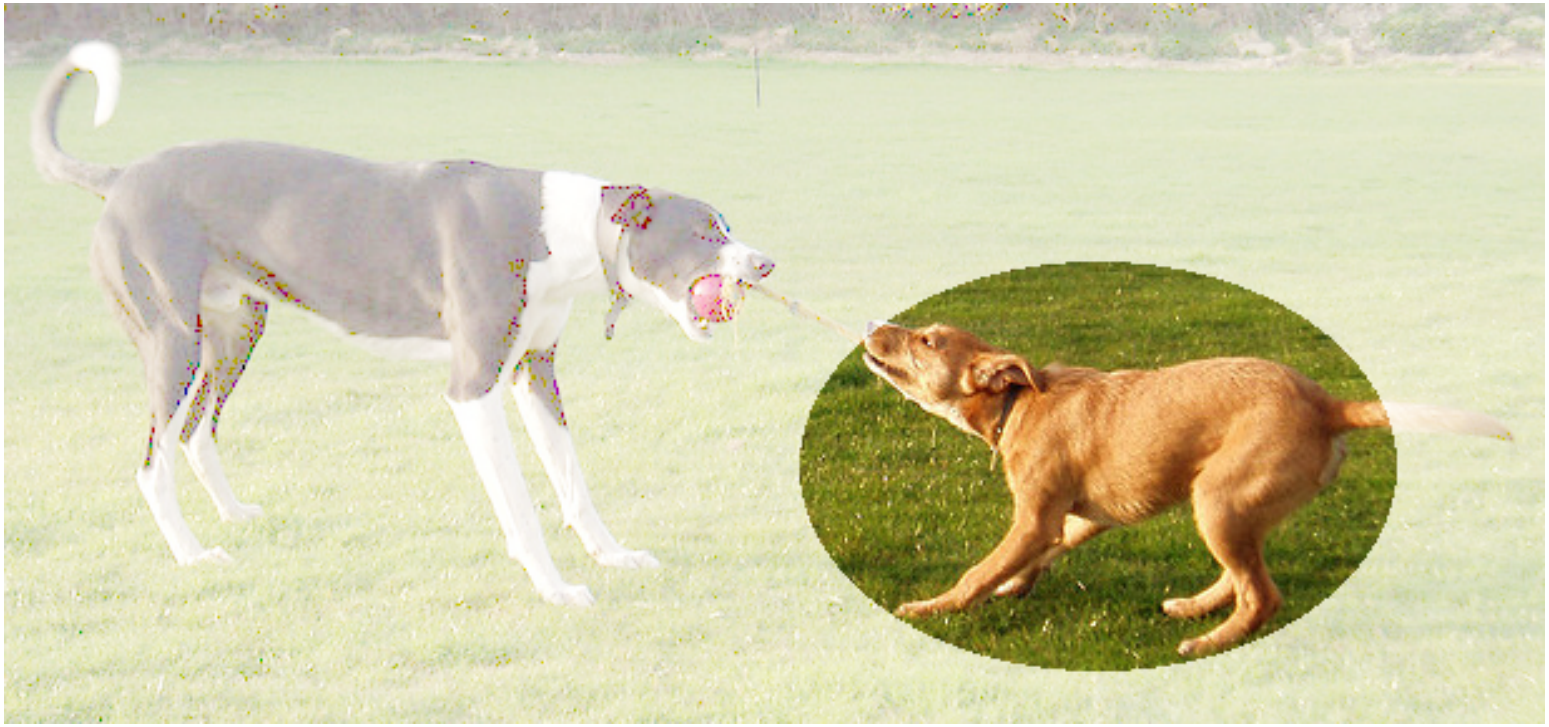
## *Irish Phrasebook*

***How's she cutting?*** – very country way of saying hello (equivalent to "*how's it going?*"

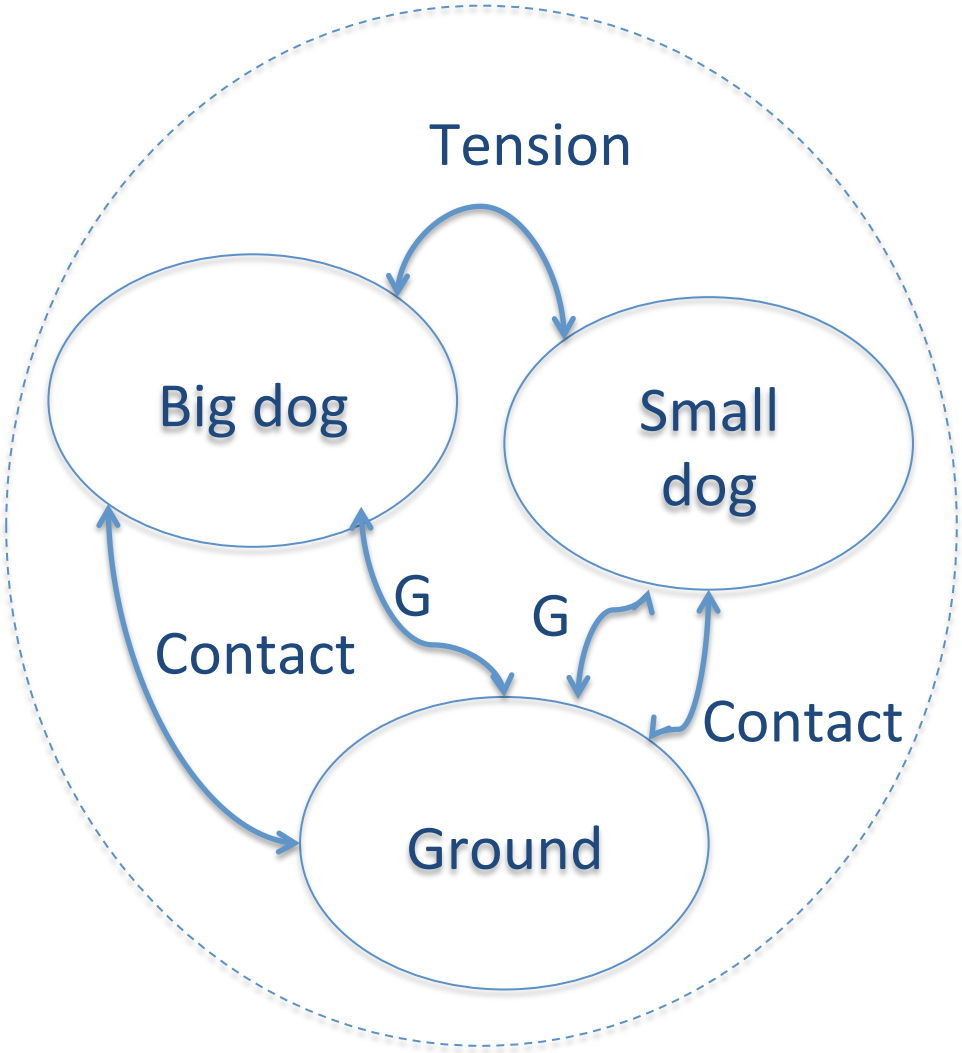
- Consider dog 2 in the two-dog tug-of-war. He isn't moving. Why not?
- Draw a free body diagram that shows why he isn't moving.




*Reading Q: How many forces do I know put in my free-body diagram?*

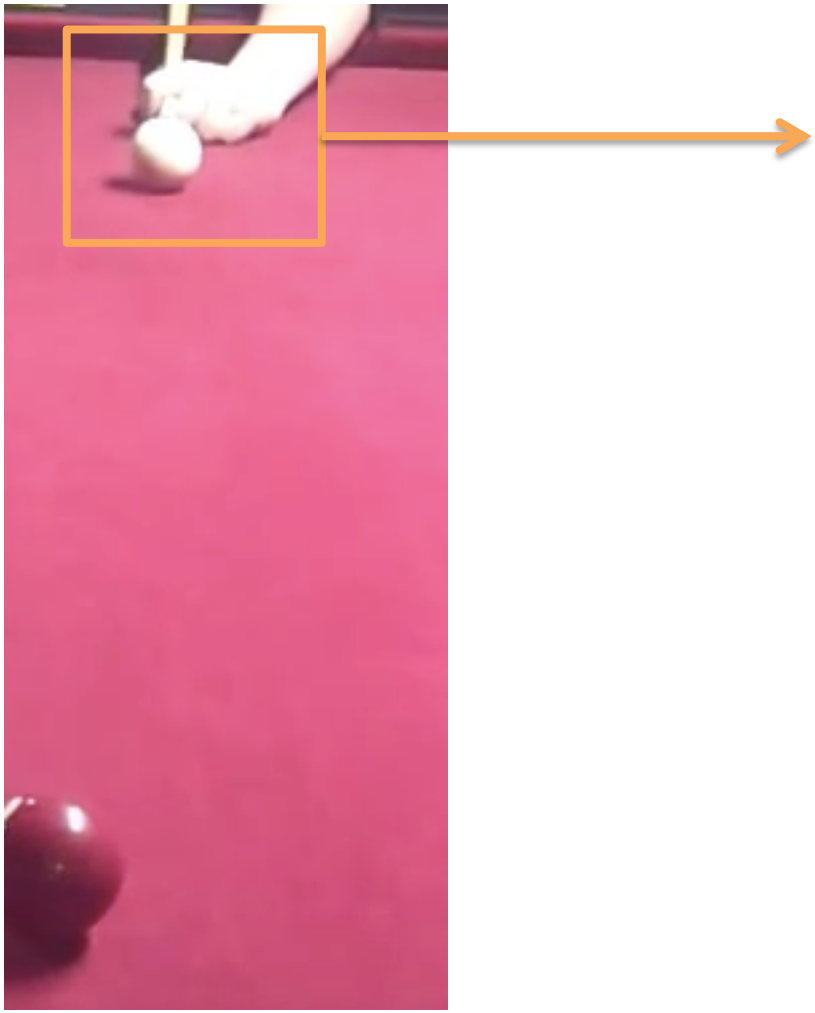


# Analysis Tool: System Schema




1. Identify all objects that influence the situation you are describing, represent each object with a circle and a label.
2. Identify all interactions between the objects. Represent each interaction with a two headed arrow, and label the interaction

# Back to our cue ball



Represent the interaction where the pool cue hits the cue ball with a systems schema and a free body diagram

Consider a heavy truck ramming into a parked, unoccupied car.



According to *common sense*, which force is larger during the collision:

A. the force exerted by the truck on the car

B. the force exerted by the car on the truck

C. both forces are equal in magnitude

Consider a heavy truck ramming into a parked, unoccupied car.



According to *Newton's 3rd Law*, which force is larger during the collision:

A. the force exerted by the truck on the car

B. the force exerted by the car on the truck

C. both forces are equal in magnitude

# Refining our intuition:


Suppose the truck's mass is 2000 kg while the car's mass is 1000 kg. And suppose the truck slows down by 5 m/s during the collision. Intuitively, how much speed does the car gain during the collision?