

The Science of Dogs: History, Genetics and Psychology of Man's Best Friend



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Outline

Amanda -
Domestication of Dogs

Pan-Pan -
Genetics of Dogs

Christine -
Psychology of Dogs

Why dogs?




Dogs in the media



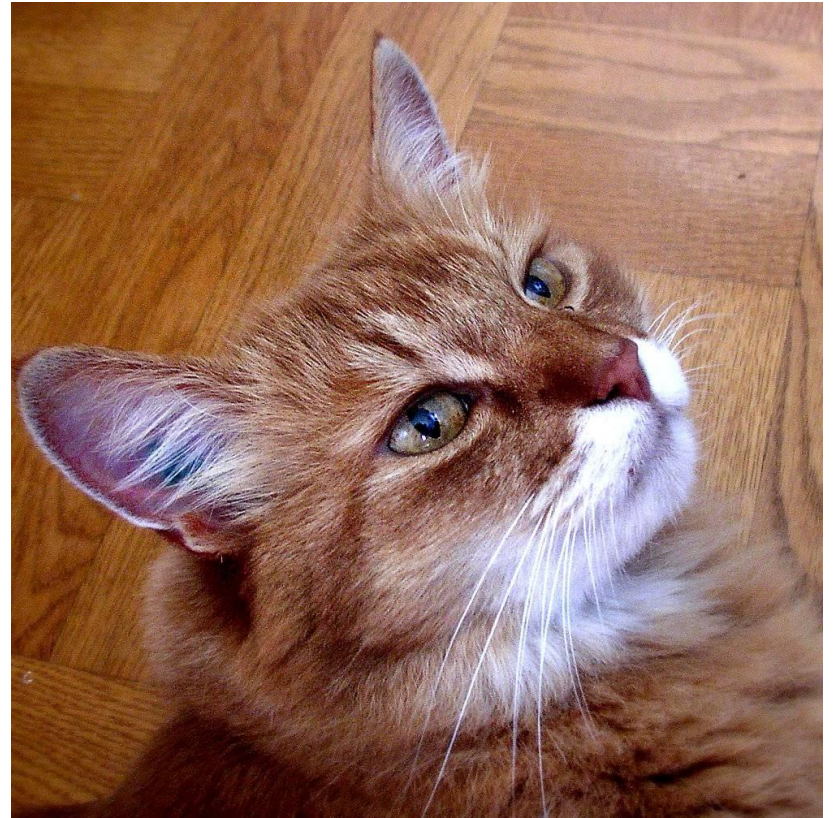
Is all this
information
about dogs
true?

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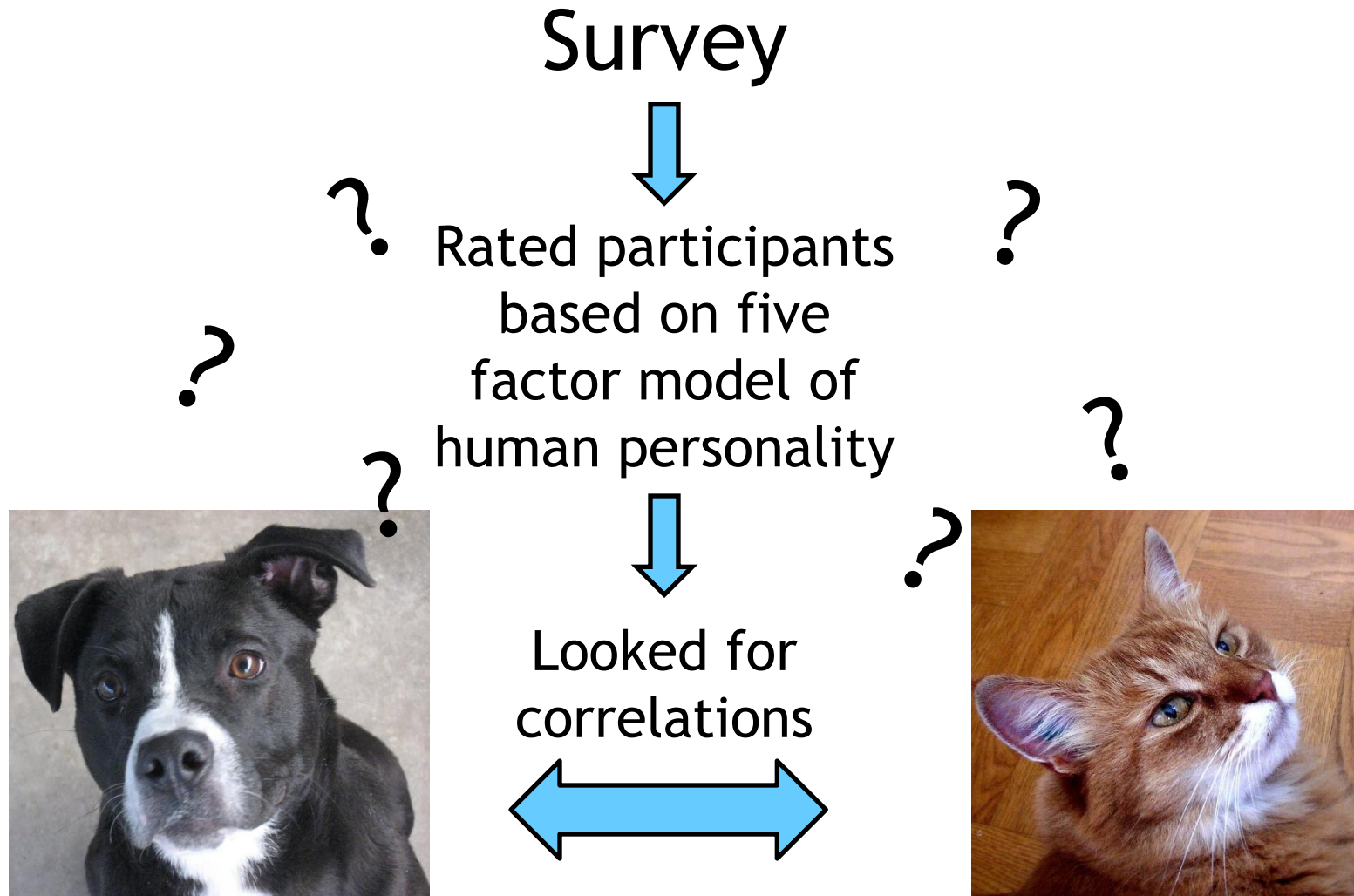
Dog behavior and psychology

-  The psychology of dog ownership
 - What does being a “dog person” say about you?
 - Can owning a dog make you healthier?
- The canine experience
 - Do dogs have a personality?
 - Do dogs experience emotions?
- Canine intelligence
 - How do we communicate with dogs?
 - Smelling danger: cancer sniffing dogs

“Dog people” vs. “cat people”

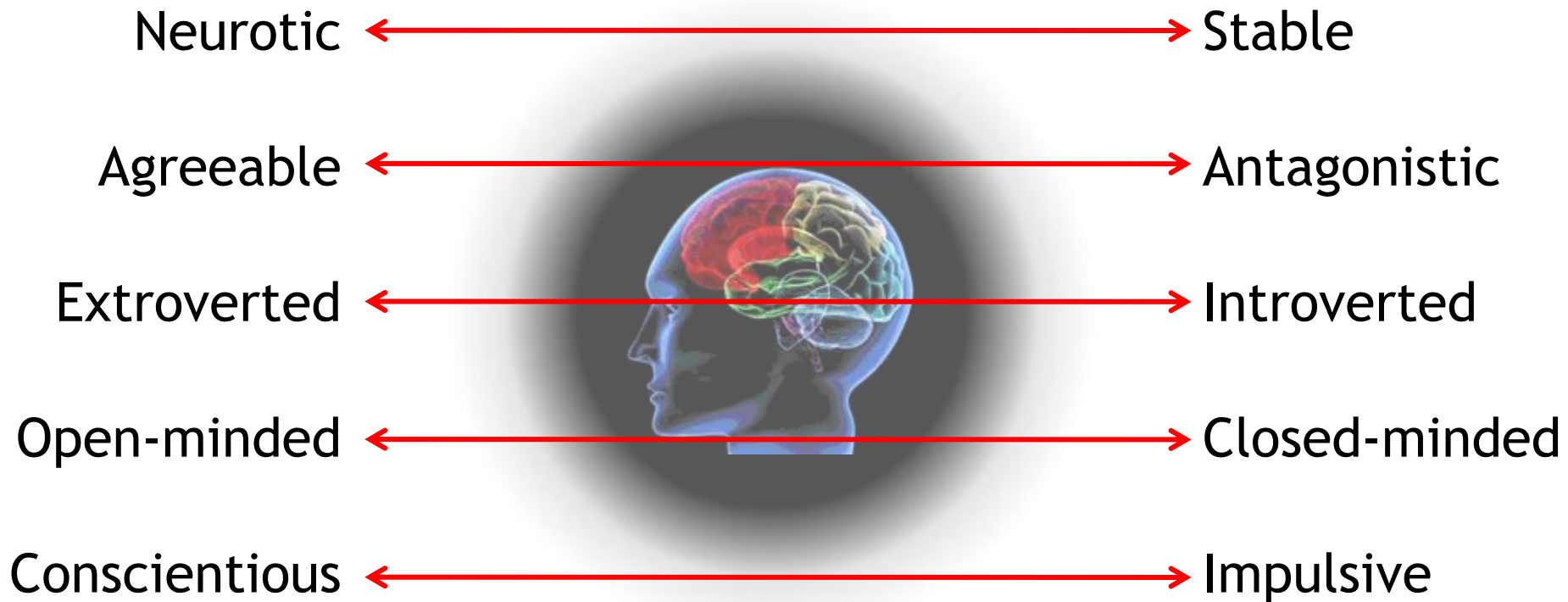


Dog people vs. cat people

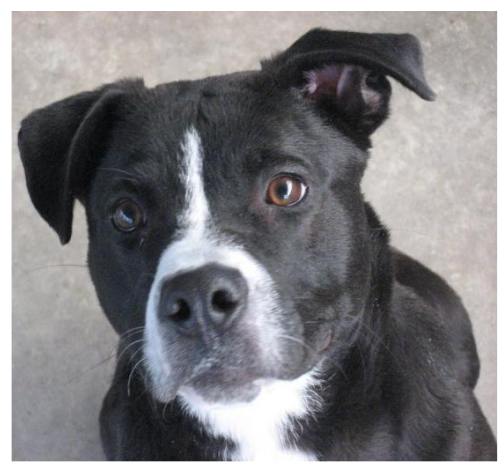


Five factor model of human personality

Questionnaire assigns you a numerical value on five spectrums:



Dog people vs. cat people



15% more extroverted
13% more agreeable
11% more conscientious



12% more neurotic
11% more open-minded



Dog people vs. cat people

What does this actually mean?

- First study to demonstrate a quantitative personality difference between dog and cat people
- Based on self-reporting of personality traits
- Differences are fairly small and are an AVERAGE!

Health & psychological benefits?

- Short term effects: stress relief
 - Lowered blood pressure
 - Slowed heart rate
 - Regular breathing
 - Muscle relaxation
 - Lower stress hormone levels
- Long term effects of dog ownership
 - Better heart health and recovery after heart attacks
 - Lower blood pressure and cholesterol levels
 - Lower levels of depression and anxiety



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The canine experience

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The canine experience

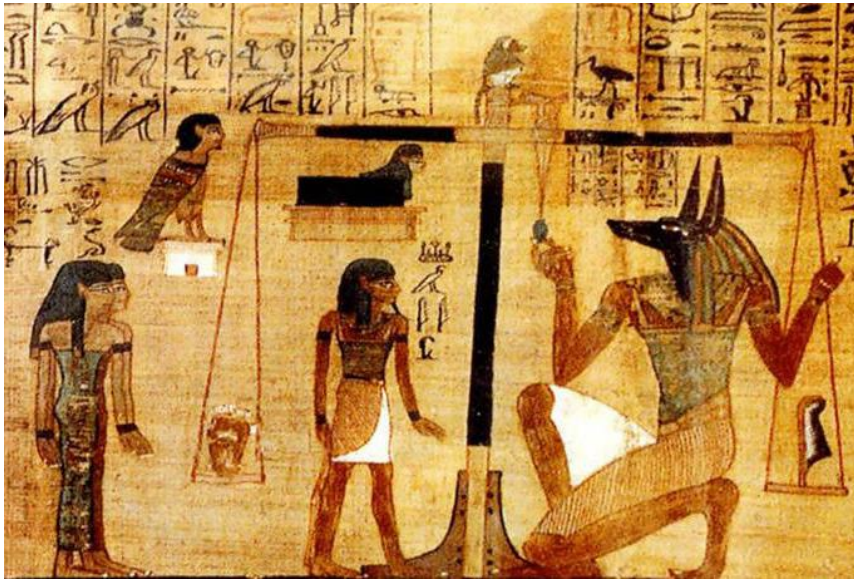
What can we know about dogs?



Anthropomorphism

(n.) an interpretation of what is not human or personal in terms of human or personal characteristics

-Merriam-Webster dictionary



Ancient Egypt: Anubis

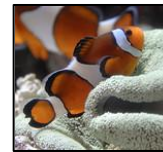
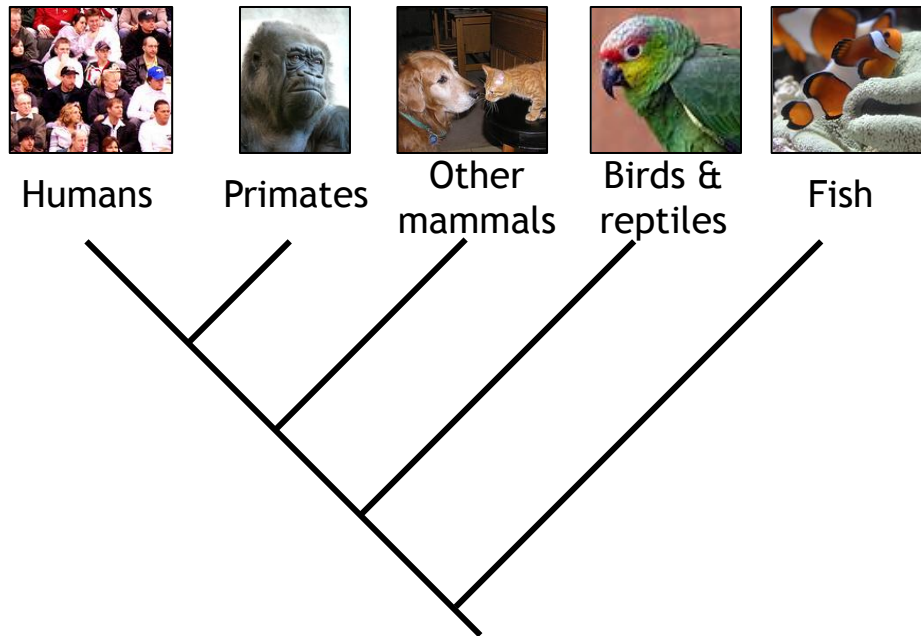


Modern: Coolidge's Dogs Playing Poker paintings

Anthropomorphism

What makes us
anthropomorphize animals?

1.) Relatedness



Humans

Primates

Other
mammals

Birds &
reptiles

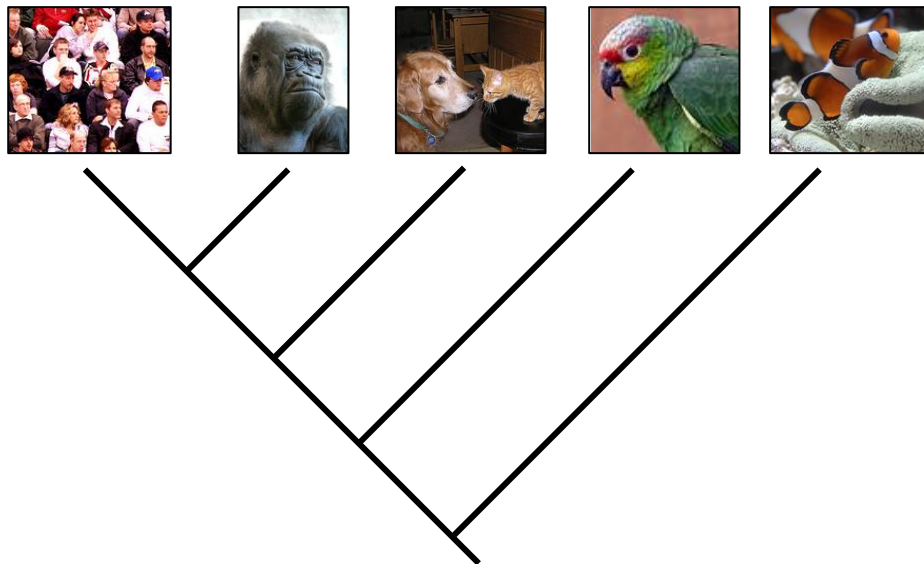
Fish



Anthropomorphism

What makes us anthropomorphize animals?

- 1.) Relatedness
- 2.) Physical features
- 3.) Behavior



Empathy
Human
Dog
Monkey
Cat
Chimp
Gorilla
Cheetah
...
Trout
Cockroach
Worm

1
2
3
4
5
6
7
...
28
29
30

Communication
Human
Dog
Monkey
Chimp
Gorilla
Cat
Parrot
...
Trout
Cockroach
Worm

What are these yawning dogs thinking?



Yawning can be a
sign of stress!



The canine experience



Do dogs have
personality and
emotions...

OR

...are we projecting
human characteristics
on them?



Do dogs have personalities?

Personality: an individual's distinctive pattern of behavior that is consistent across time and situations (Family Dog Project)



What traits are measured in dogs?

- Dominance
- Aggressiveness
- Activity
- Impulsivity

...and others

Genetic differences may underlie some of these personality traits!

Ex. German Shepherds: dopamine receptor gene



Dog emotions: can dogs feel guilt?

- **Experiment:**

- Dog is told not to eat a treat
- Owner cannot see if dog obeys
- Owner is told to scold or praise the dog

- **Outcome:** all dogs act “guilty” when scolded, whether or not they ate the treat!

- **Conclusion:** Dogs do not experience guilt!



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Canine intelligence

- How do we communicate with dogs?
- Smelling danger: cancer sniffing dogs

Human-dog communication

- Communication: behavior from one individual that produces a predictable response from another
- Dogs often rely on communication with humans while trying to solve problems



Hand gestures



*Duke Canine Cognition Center
(Brian Hare)*



Human-dog communication

- Communication: behavior from one individual that produces a predictable response from another
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Hand gestures



Eye contact

Dogs can smell...



Missing humans...



Drugs...



Explosives...



Bedbugs...



Can dogs smell cancer?

- **Anecdotal evidence:** dog owners have claimed to have sought medical care because their dogs have obsessively sniffed at moles or regions of their bodies that were revealed to have internal tumors
- **Scientific studies:** the caveats
 - Very new field of study
 - Studies were small in size
 - Results are cautiously optimistic
 - Larger, better controlled studies are necessary



Pine Street Foundation

Can dogs smell cancer?



Training period: dogs are rewarded for identifying cancerous samples

Testing period: dogs are presented with new samples and their accuracy is assessed

-
- **Trial 1: Identifying bladder cancer from urine samples**
 - Tested 6 dogs, 54 times total
 - Dogs are presented with sets of 7 samples, 1 cancerous
 - If selection is random, expect 14% success rate

Observe a success rate of 41%

Can dogs smell cancer?



Training period: dogs are rewarded for identifying cancerous samples

Testing period: dogs are presented with new samples and their accuracy is assessed

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- **Trial 2: Identifying lung & breast cancer from breath samples**
 - Tested 5 dogs on about 80 cancer samples and 80 healthy samples

Observe a success rate of 88% for breast cancer, 99% for lung cancer

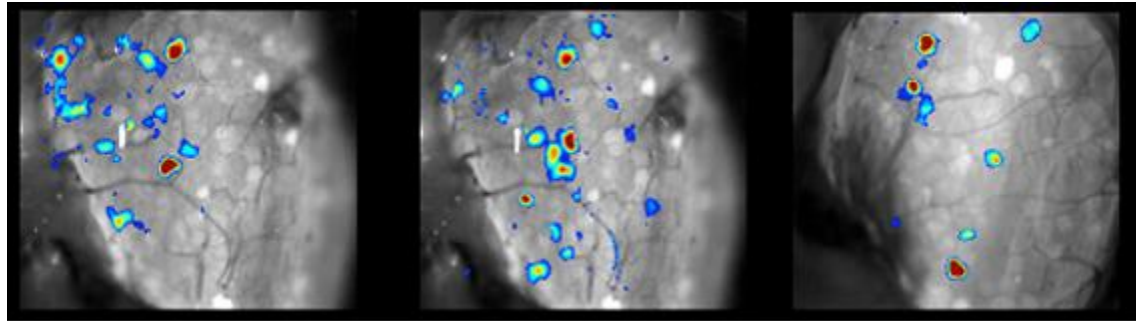
Can dogs smell cancer?

- **Conclusion:** Dogs, with variable accuracy, do seem to be able to use scent to detect cancer
- **How is this possible?** Cancerous cells produce chemicals dogs, but not humans, can smell
- **What does this mean for medicine?**
We can now try to identify these chemicals & design an “electronic nose” that can detect them



Want to learn more about the sense of smell?

LAB TOUR: Datta Lab



The Datta Lab studies how the brains of lab mice respond to odors and other environmental signals

Summary: The Science of Dogs

- **Domestication:**

- Dogs evolved from wolves ~15,000 years ago, probably in East Asia
- Domestication can be recapitulated within 60 years by selection of non-fearful animals

- **Genetics:**

- Dogs are genetically diverse between, but similar within, breeds
- Dog and human genetics can be used to inform and advance each other

- **Psychology:**

- While it is important to remember that dogs are not people, they are clearly complex, intelligent creatures
- Humans benefit personally and as a society from our relationship and communication with dogs

Thank you!

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