

# ALL DOGS ARE INDIVIDUALS

why looks don't equal behavior



## MEET THE CANINE GENOME

The dog genome consists of approximately **20,000** genes

Variation across **50** genes determines breed defining physical traits

Variation in very few genes determines a dog's head shape. In **BRACHYCEPHALIC** dogs, it's just **1** gene

This means that **LESS THAN 1%** of a dog's genes determine **PHYSICAL APPEARANCE**



When we look at a dog and see breed, we are seeing **ONLY ROUGHLY 50** of their nearly **20,000** GENES **0.25%**

That is **0.25%** of a dog's **ENTIRE GENOME**.

The set of **50** genes associated with physical appearance is **DIFFERENT** from the set of thousands of genes responsible for **brain development** and **function**.

**LOOKS DON'T EQUAL BEHAVIOR**



How are **PURE BREED** and **MIXED BREED** dogs different?

Pure breed dogs come from a **CLOSED** gene pool.

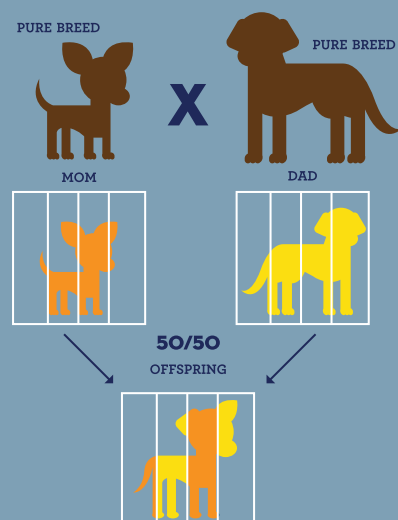


Mixed breed dogs come from a **VARIED** gene pool.

Once a dog is **LESS THAN 100%** of a single breed, they have genetic variations that make them **DISTINCT** from that breed.

A **MIXED BREED** DOG IS **NO** BREED AT ALL!

## MEET THE PARENTS



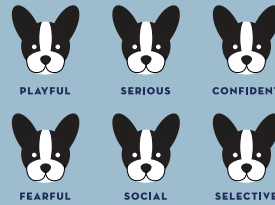
We can't accurately predict the behavior of **MIXED BREED DOGS** by comparing them to **PURE BREED DOGS**, even if the pure breed dog is a parent.

The offspring of 2 different pure breed dogs isn't a member of either parent's breed.

**IT IS MISSING 50%** of each parental breed's DNA, and we don't know **which 50%**!

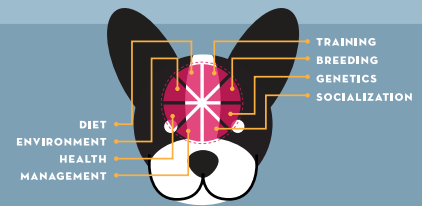
## PURE BREED DOGS ARE NOT CLONES

Unlike human identical twins, pure breed dogs have different DNA



Dogs may look alike, but only **0.25%** of their genome determines their breed defining physical traits. *The rest can vary.*

The behavior of **ALL** dogs is influenced by many factors. That is why breed traits are **POSSIBLE** but **NOT GUARANTEED**.



## What about DNA tests?

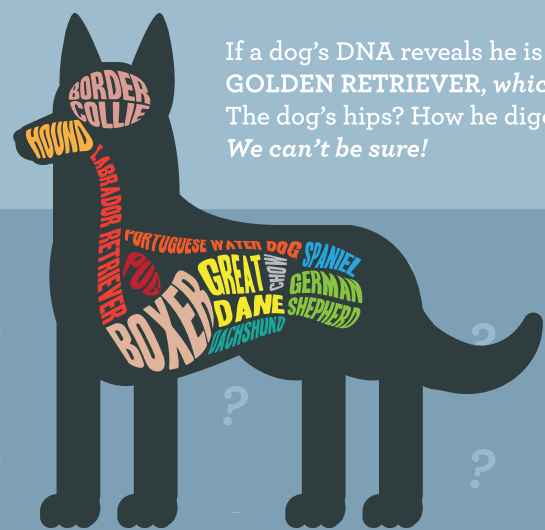
DNA tests help identify a dog's ancestors. Knowing a dog's breed mix will not help us determine behavior because:

**1. the BEHAVIOR** of **ALL** dogs (pure breed or mixed) is always influenced by a variety of outside factors.

**2. ONCE A DOG IS A** mixed breed dog, they are not a member of any breed. Each mixed breed dog, even those from the same litter, will have a unique genome.

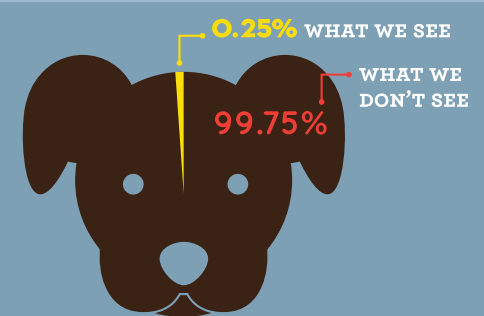
**3. EVEN IF WE KNOW** the breeds present in a mixed breed dog's DNA, we do not know which parts of the dog are influenced by those breeds.

**FOR EXAMPLE**



If a dog's DNA reveals he is **12.5%** **GOLDEN RETRIEVER**, which **12.5%** is it? The dog's hips? How he digests food? *We can't be sure!*

## YOU CAN'T JUDGE A BOOK by its cover



Visual identification of mixed breed dogs is highly inaccurate.

**We cannot accurately predict future behavior based on how a dog looks on the outside, their breed, or their DNA results.**

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**GET TO KNOW EACH DOG IN FRONT OF YOU!**

### CITATIONS:

- The Dog and It's Genome by Elaine Ostrander
- Genetics and the Social Behavior of the Dog by Scott and Fuller
- National Geographic: <http://gen.nationalgeographic.com/2012/02/10/dogs-are-not-clones/>
- Kristopher J. Brannan, PhD: <https://www.researchgate.net/publication/261979521>
- Janis Bradley: The Reliance of Breed in Selecting a Companion Dog: <https://www.researchgate.net/publication/261979521>
- Dr. Victoria Voith: <http://www.nationalcanine.com/research/choosing-a-dog-for-identification/>



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### ABSTRACTS:

- Brachycephalic traits: <http://www.ncbi.nlm.nih.gov/pubmed/20224756>
- Morphological traits: <http://www.ncbi.nlm.nih.gov/pubmed/20714490>
- Brain development genes: <http://www.ncbi.nlm.nih.gov/pubmed/22051440>
- Canal laceration development: <http://www.ncbi.nlm.nih.gov/pubmed/10781454>
- <http://www.ncbi.nlm.nih.gov/pubmed/20083277>
- Canine skull development: <http://www.ncbi.nlm.nih.gov/pubmed/25396475>