



Institute for Advanced Physics

# What is the Difference Between a Lab and a Border Collie?

by Anthony Rizzi

Have you ever wondered what the difference between a dog and a cat is? I mean really wondered what essentially makes a dog a dog? How about what makes this dog different than that dog. Well, that's what this article is about. We are about to plunge into what makes this dog different from that dog. We are going to do it in a general way so that you can then begin to think about what makes you different from your brother or your friend. We will begin, well, at the beginning, and then proceed to what a dog is and then get to the question of the title in a general way, which is finally pointing at what makes an individual this individual.

To start we have to recall the ground of all of our knowing, which are the things we know through our senses, principles that are laid out in the *A Kid's Introduction to Physics (and Beyond)* (KIP).<sup>1</sup> In particular, a physical thing is something and can become something else. We call what it is actually, its *form*, and what it is potentially its *matter*. Every physical substance is a form-matter composite. Furthermore, physical substances have properties (see KIP). Through their properties

<sup>1</sup> *A Kid's Introduction to Physics (and Beyond)*, Anthony Rizzi (2012) for the first time at this level gives the larger set of first principles that we get through our senses. Note that this kid's book is for everyone, including adults. It is called a kid's book because the principles are those that should be learned as a child and because it is presented at a very simple level. Since none of us were taught the principles in the book, we can say it is for the kid in each of us.

we learn what they are essentially, i.e., we discover their essence.

Through thinking about the things around us that we learn as children,<sup>2</sup> we can discover that the essence of an animal is a physical substance with inanimate powers,<sup>3</sup> vegetative (i.e., powers to live), and sense powers, i.e. power to know through feeling and/or seeing and/or hearing etc... This is the generic (general) essence of an animal. What is a dog? We will not exhaustively answer this rather hard question, but instead give you the key pieces as well as the general structure of how to approach the question so that you can get more of the pieces yourself.

The distinction between animals resides most fundamentally in their core powers, which reveals their essences. The highest power of an animal is its sense knowledge. To distinguish, then, a dog from a cat, one needs to look at their intelligence.<sup>4</sup> Cats are oriented towards solitary activities, especially solitary hunting, whereas dogs are oriented towards pack

<sup>2</sup> See *The Science Before Science: A Guide to Thinking in the 21<sup>st</sup> Century* (SBS), Anthony Rizzi (2004) for exposition of how we get from physical things to a knowledge of ourselves.

<sup>3</sup> By this I mean the generic physical qualities such as color, mass (including the ability to have impetus), and the ability to apply a force to other bodies. Also, recall all physical things will have properties in all nine categories of properties; for example, the dog will have the first property of extension.

<sup>4</sup> Note well here, intellectual knowledge, which distinguishes men from *mere* animals, is a qualitatively different type of intelligence than the sense intelligence that we discuss here.

activity. From the fact that cats eat only meat (more generally animal products), i.e. that they are carnivores, we know that they have a need to be able to relate to other animals in a non-surface way. They must be able to figure out their prey enough to capture them. From the fact that dogs are omnivores we know that they have a relationship with both plants and animals.

Thus, we can say dogs are social animals (because they need to relate to others in the pack), and they have a relation with *other* species and with plants, whereas cats don't need the social interaction with other cats or an interaction with plants in the way dogs do. These things reveal each of the animal's distinctive intelligences. In particular, dogs have a fundamentally higher type of intelligence than cats because of their ability to interact with other dogs. This is why one can train dogs to do things that cats cannot learn.<sup>5</sup> So, let's provisionally<sup>6</sup> take the essence of a dog as a

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<sup>5</sup> However, keep in mind that an animal with *qualitatively* higher intelligence is not always able to do everything better than an animal of lower intelligence. For instance, an animal that has an ability to a high degree might surpass in that order the ability of an animal that has a qualitatively higher intelligence but of a low degree. Remember qualities can be more or less strong or intense. A body can be, for example, a deeper green or a lighter green.

<sup>6</sup> Further refinement and/or further qualifications may be needed. For example, one may need to add something reflecting how the nature of a dog's intelligence is specified by its need to care for its live-born young. In discovering the essence of an animal, the empiriological categories established in modern biology are invaluable but need to be properly unpacked and understood, so as to shed light on the nature of the animal's intelligence. See *The Science Before Science: A Guide to Thinking in the 21<sup>st</sup> Century* (SBS) for further discussion. In this article, we have not focused on animals' relationship with man, which needs to be done as well, especially to bring out the domestic aspect of, for example, a dog. In this definition, we consider the dog's core

*social, land-only<sup>7</sup> animal that has an essential (survival) relation to other higher animals<sup>8</sup> and to plants.<sup>9</sup>*

So, we have now specified the form of the dog; remember the form calls for the matter. Real dogs are, like all physical things, something that can become something else (form/matter composites). The definition of "dog" above gives only the generic essence, which cannot, of itself, be anything else. If we try to "subtract" one of the elements of the definition, we no longer have a dog. However, real dogs do not, for example, have general social interaction but particular interaction. There is only this dog and that dog, not dog in general. We have specified the *formal essence*; we need the *material essence*, that is, that part of the animal that makes it *this* animal, i.e., individuates<sup>10</sup> the general (formal) essence. We could say it terminates the generic essence *analogically* like a point terminates a line.

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nature as it would be manifested by its life in the wild.

<sup>7</sup> "Land" is meant to be contrasted with water or air/land (such as birds). "Land-only" is used instead of simply "land" to indicate that the dog has no special abilities in leaving the land. This, of course, does *not* mean that dogs do not go temporarily into water or do not jump into the air. It does, however, mean that they have no special abilities to stay in the air or water or to climb into trees or the like. Such additional powers might indicate a further qualitative distinction in the nature of the animal's intelligence.

<sup>8</sup> By "other higher animals," we bring out the point that dogs themselves are higher animals, having highly developed internal senses, and that they relate to other such animals. "Higher animals" excludes, for example, insects and, of course, amebas.

<sup>9</sup> Note this includes wolves as they are in fact, a species of canine. They can, for example, interbreed.

<sup>10</sup> Scholastics called this difference that is outside of the generic essence "modal differences." We are here making further distinctions and will not need to use this term, but this does not, of course, change the fact that material essence refers to the same reality.

Now, the material essence does not refer directly to prime matter. That is, it does not refer directly to its potency to be another *physical substance*. The material essence determines how the potency of the generic (formal) essence is to be terminated or individuated in different ways. When a substance is this substance, the generic essence (formal essence) is, then, limited by the material essence to be this particular one, not that one. It is here not there. It is white, not brown. Don't let the term formal essence confuse you. It does not mean that the material essence of the dog (or whatever physical substance) is not actual, i.e., that it is solely potential. The appellation "formal" is to be taken relative to "material." That is, the formal essence must be as it is for the dog to be a dog, but there are many ways of being a dog. So there is a second element needed beyond the formal essence to have a real dog. This second element, the individuating part of the essence (material essence), is in a certain way potential to the generic essence (formal essence) of a dog. But, the material essence determines the dog to be *actually* this way, not that way. My daughter's dog is *actually* brown with white patches (though another dog is not).

What determines what is part of the generic (formal) essence? The generic essence is revealed by the qualitative nature of the highest powers. Things that differ in formal essence (i.e., species in the most proper sense<sup>11</sup>) differ qualitatively in the highest power. The dog has, expressed in its social nature, a qualitatively different kind of sensorial thinking than a cat. We say they have qualitatively different internal senses (see *The*

<sup>11</sup> This is broadly distinct from the classifications used in empiriological biology and from the particular use of the word "species" used there.

*Science Before Science: A Guide to Thinking in the 21<sup>st</sup> Century*). One dog might be smarter than another, but it is a matter of degree, so the difference between dog breeds is not a difference in species, not a difference in formal essence but in material essence. Differences between material essences are manifested by differences in intensities of the same quality or differences in "inanimate" physical powers.<sup>12</sup> In the end, the differences between material essences reduces, in some sense, to differences in inanimate powers, as the degree of the higher powers is determined by the material essence, and this degree is fixed on the side of the lower (i.e. inanimate) powers. In this way, we can say the difference between a dog and a cat is manifested by their qualitatively different higher powers, e.g., their different types of knowing. Whereas, the difference between a Labrador retriever (lab) and a border collie will come down to which is smarter (degree of intelligence), which is faster, what color they are and the like.

<sup>12</sup> Scholastics use the following terminology to express this: "modal aspects (individuating aspects) are in signed matter" or "signed matter is what individuates physical substances." "Signed matter" means matter as quantified (extended.) This term is somewhat cryptic, but it simply points to the fact that quantity is the closest property to potency (see SBS and KIP). We say it is more on the side of potency than actuality. This, by the way (see SBS), helps one see the domain of strength of the empiriometric method (which looks at the world through quantity (including analogies to quantity)) and also reminds us why it works so well (see SBS and KIP). Now, every quantity is determined by a quality (see KIP); e.g. shape determines the extension to be this long rather than that long. So, in the final analysis, "signed matter" refers to the lower qualities and individuating the degree of the already existing powers. This is why morphology (shape and structure, internal and external) is important, even at the level of the highest animals. In modern empiriological biology an important part of the phenotype is the animal's morphology.

There is one hugely important exception to this understanding of the material essence; the sex of the animal. The sex of an animal belongs to the animals of that species in a different way than the other parts of its material essence. One does not have “dogness” unless he has a male *and* a female “dogness.” A male and a female dog have, in potency, all dogs. A male dog abstracted from all female dogs is not completely what one means by a dog. More to the point, it is not what “male” means! Still, the distinction in sex is on the material side, as the sex does not determine a new species. Why not? After all, the sex of the dog determines it to be qualitatively different in its highest powers; the male dog is active in a fundamental way and the female dog is receptive, in a complementary way, with respect to that activity. This is manifest in canine behavior. For example, getting a male dog means getting a dog that will be much more likely to be trying to “break away” and go places. All this is true. However, the qualitative distinctions are of a fundamentally different type. They are analogically<sup>13</sup> active and receptive, so that they demand each other to make any sense at all. Hence, to put them in separate species is to make them into nothing! Hence, sex is a unique part of the material essence, but it is also involved in the formal essence in the way just explained. One can therefore refer to the male/female distinction as a distinction within the nature, calling sex, if

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<sup>13</sup> The first meaning of action and reception comes from inanimate things (see KIP and SBS). For animals, the use of the words is much more dynamic involving the highest powers of the animals not just the inanimate powers. However, they do flow from the highest to the lowest, so that the lowest also generally manifest that action/reception distinction.

properly understood, a distinction in “sub-nature”.<sup>14</sup>

So, what is the difference between a lab and a border collie? We answer only very simply to recall our points for this specific case. Border collies are smarter because they herd animals. They herd sheep. Labs were bred to work with men to collect prey (especially water birds) that they shot. This requires less intelligence as it does not require as much knowledge of and thinking about the behavior of another (moderately high level) animal; the men can do most of the thinking. Both are dogs, but each forms a subclass determined by their distinct material essences. In thinking this way, the human mind moves from the very general understanding of a dog as a physical substance (something that can become something else) to the more specific identification of the dog as a border collie to get closer and closer to understanding this border collie and how it is distinct from all others. The real world is particular but our mind starts with the very general.

*Anthony Rizzi, Ph.D., Director of the Institute for Advanced Physics, gained worldwide recognition in theoretical physics by solving an 80-year old problem in Einstein's theory; has physics degrees from MIT and Princeton University; has been senior*

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<sup>14</sup> Male and female are part of the formal essence of the dog in so far as that formal essence makes no sense without the *general* male/female distinction (because its social nature requires others of its same species). However, that distinction is finally a material one because, of course, having the potential to be either does not fix which one a given animal is. That is, the choice of sex begins the process of individuating the generic (formal) essence. The male/female distinction can be seen to be very close to the formal essence as it leaves only two possibilities to be fixed on the material side. By contrast, color, for example, leaves a practically infinite number of possibilities.

*scientist for Cal-Tech's Laser Interferometer Gravitational-wave Observatory (LIGO), which was awarded the Nobel Prize in physics in 2017, and taught graduate courses at LSU; worked on the Manned Mars Craft and the Mars Observer spacecraft; received the NASA Award, as well as, a Martin Marietta New Technology Award.*

*He is author of The Science Before Science: A Guide to Thinking in the 21<sup>st</sup> Century and A Kid's Introduction to Physics (and Beyond); he has been interviewed in many media outlets. In addition to his professional articles, Dr. Rizzi recently authored the ground breaking texts Physics for Realists-Mechanics and Physics for Realists-Electricity and Magnetism (both recommended by the journal of the American Association of Physics Teachers). Dr. Rizzi has just completed the revolutionary Physics for Realists: Quantum Mechanics textbook now available on the Institute for Advanced Physics web site.*

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