

# Influence of the Dog's Temperament on the Formation of its Behaviour

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**Abstract:** We observed and examined the behaviours of 40 puppies of German Shepherd and Belgian Shepherd breeds (20 of each breed) at the same age. We categorized the nervous system (temperament) of half of them (10 German Shepherds and 10 Belgian Shepherds at the age of 80 days) per the Breto method. The temperaments of the remaining 20 dogs from both breeds remained unknown to us. We compared the behaviours of all 40 puppies with known and unknown temperaments at a later age (8 months) through the "lure" method. We found out that the puppies whose temperaments had been previously established exhibited fewer pathoethical phenomena compared to the others (whose nervous system type could not be established by our team), which means that mandatory categorization of the dog's nervous system (during the period of primary socialisation, when the results are most accurate) for the sake of a proper approach to its training can help the building of a successful behavioural model and the avoidance of pathological conditions.

**Keywords:** Dog's behaviour, temperament, early education, nervous system categorisation.

## INTRODUCTION

A dog's behaviour is formed under the influence of factors from the environment (biotic and abiotic), which affect their primary and secondary socialisation (adaptation to the environment).

Primary socialisation begins immediately after the puppy's birth, starting at the age of 3 weeks and ending around the age of 3 months [1-5]. It is during this period that the first contacts with the factors of the environment (biotic and abiotic) occur, through which the puppy forms relations, building up its behaviour [6-12]. In general, the primary adaptation to the environment happens very quickly and remains stable in the long run (for the entire life), unless other factors are involved (stress, incorrect primary training, etc.), which would act as impediments [13-17].

Secondary socialisation (referred by some as re-education) is needed, if primary socialisation was problematic, i.e. the puppy was trained in accordance with a specific behavioural model (e.g. guard, companion, odourologist, etc.), yet exhibits ethological deviations after the age of 3 months, when primary socialisation should have been finished [6, 18-25]. In such cases, the dog needs secondary socialisation, or re-education, yet this is difficult to accomplish in certain situations and is easily broken or forgotten, unlike primary socialization, unless the animal is consistently trained towards the desired behaviour [14-17].

It is known that dogs have 4 types of nervous system (temperaments), just as humans do:

- **Sanguine type /L/** - strong, stable temperament;
- **Choleric type /F/** - strong, unstable temperament;
- **Phlegmatic type /G/** - not as strong as the first two, slower temperament;
- **Melancholic – asocial type /A/** - weak, melancholic temperament.

Does the dog's genetically based temperament on its socialisation and formation of behaviour, apart from the factors of the environment? Many ethologists have worked on this issue, considering the fact that dogs practice numerous jobs – odourologists, guards, companions, child caretakers, rescue operatives, etc. Thus, dogs often, and sometimes even invariably, accompany humans in their various activities. From this perspective, it is of particularly great importance for the question posed above to find its accurate and scientifically founded answer [2, 4, 5, 7-9, 19]. Researchers are divided into two groups, however. The first group believes that it is only through successful and proper selection that the best dogs are chosen and kept, with regard to the goals they are used for [3, 4, 9, 20]. This means they denigrate temperament's role in the building up of the animal's behaviour format through primary and secondary socialisation. They rely upon high-quality selection with the participation of specifically chosen dogs with excellent

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qualities for the respective breed and the work they would be assigned to do. Those that exhibit weak temperaments are excluded and not used for breeding.

Another group of ethologists, however, believe that a dog's temperament must be known at all costs during the formation of its behaviour [15, 13, 22, 23, 25-27]. Thus, the trainer would have a proper approach towards the animal, and behaviour would be modelled easily and without difficulties, avoiding the development of the commonly encountered pathoethological deviations and long-term conditions that obstruct both the dog and human. There is often a need for secondary socialisation, which leads to time loss and is not always successful, even if we do not consider the fact that it does not always persist (unstable). The issue has often been put forth before our colleagues from the first group, the ones that emphasise the quality of selection over the influence of temperament in the formation of the dog's behaviour. One question may be why stubborn and hard to treat pathoethological phenomena occur in pure-bred dogs that had worked fine previously, but at one moment started exhibiting depression, high-grade fear transforming into pathological aggression, etc., i.e. conditions that are hard to control through medication.

Furthermore, our literature review did not encounter any convincing scientific statements that answer the question of why the results can be so different after proper primary training of two dogs from the same breed and category. Why does one dog build up the desired behaviour quickly and successfully, while the other does not? There are authors that believe training a dog for a specific behaviour depends primarily on the trainer, whereas everything else is up to the quality of selection [10-12, 21, 22, 28]. If the breed is properly selected, all dogs from it should quickly and easily achieve the desired behavioural format, i.e. they still consider it unimportant to know the dog's temperament. Their training should be able to be conducted "blindly" and still be successful [25, 29, 30].

We cannot disagree with the viewpoint, however, as practice shows otherwise. The training is conducted in accordance with the respective rules, and yet results come quickly for some dogs and behavioural pathology does not occur, while in others, from the same breed and category, severe behavioural trauma emerges. The lack of specific and scientifically founded answers in this regard drove us to conduct the present experiment.

## MATERIAL AND METHODS

We studied the behaviour of two dog breeds, Belgian Shepherd (BS) and German Shepherd (GS) – 20 puppies from each breed during the spring period. Total number of studied dogs – 40. The choice of breeds was deliberate, since we wanted to trace the behavioural modelling of dogs working as odourologists and guards. The study team and support staff remained the same throughout the entire experimental period. We aimed to achieve maximum sameness in the housing conditions (biotic and abiotic) for the dogs, in order to get more accurate and reliable results.

All 40 observed animals were kept under the same zoo-hygienic rearing conditions for this species and category of animal. We examined the primary microclimate parameters for the respective breeding systems (indoor and semi-indoor) – average daily air temperature, relative air humidity and air movement speed measured and recorded via Multi-Function Environmental Meter PCE-EM 882, content of harmful gases in the air (average values of NH<sub>3</sub>, CO<sub>2</sub>, H<sub>2</sub>S: via indicator tubes), complete veterinary hygienic evaluation using check-lists. Drinkable water was always available from special heavy vessels (so that they would not topple) made of stainless steel and with rounded edge (so that the animals would not hurt themselves). Feeding was dry and twice a day (morning and evening) with dry food.

At the age of 80 days, we conducted a categorization of the nervous system type (temperament) of 20 experimental puppies – 10 German Shepherds and 10 Belgian Shepherds, during the period of their primary socialisation, per the Breto method (as this is when the results are most accurate). A sufficiently large mirror was used, allowing the dogs to see themselves in full. The following ethological activities (frequency of occurrence) and reactions in the animals were recorded: vocalisation (V), movement (M), curiosity (C), fear (F), aggression (A), or depression (D). The observation was maintained for 15 minutes for each animal. The remaining 20 dogs were purposefully left with unknown nervous system types.

To acquire general information on the behaviours of all 40 experimental animals, we applied the "lure" method at the age of 8 months. Attached to one end of a wire wound around a pulley was a "white handkerchief – lure" (dogs are dichromatic animals, better able to discern black and white), which could be moved with the aforementioned device. We kept track

of the animals' ethological activities – vocalisation, movement, curiosity, fear, aggression, depression.

Two experiments were conducted – one to categorise the temperaments of only 20 dogs per the Mirror test of Breto – evaluation of the seven behavioural activities on a 4 – point scale (0, 1, 2, 3 points). The observation was repeated five times, each of 2-hour duration, every other day by means of video camera), and a second one to make a general profile of all 40 animals' behaviour (including those with unknown temperaments) at the age of 8 months per the "lure" method.

The animals were numbered as follows:

- Dogs GS1, GS2, GS3, GS4, GS5, GS6, GS7, GS8, GS9, GS10, BS1, BS2, BS3, BS4, BS5, BS6, BS7, BS8, BS9, BS10 with established temperaments and examined behaviour – 20 puppies total;
- Dogs GS11, GS12, GS13, GS14, GS15, GS16, GS17, GS18, GS19, GS20, BS11, BS12, BS13, BS14, BS15, BS16, BS17, BS18, BS19, BS20 with non-established temperaments and examined behaviour – 20 puppies total.

## RESULTS AND DISCUSSION

All 40 animals from both breeds were kept indoors up to the age of 37 days, after which they were placed in single semi-covered cubicles with small yards for walks.

The indoor rooms were organised as two special sections, one next to the other, with a total area 50 m<sup>2</sup>. The puppies of the German Shepherd breed were born and kept together with their mothers up until the moment of weaning (5 weeks of age) in one section, with the Belgian Shepherd puppies in the other. The newborn animals, alongside their mothers, were kept in rooms with microclimate conditions corresponding to this animal species and category (average air temperature: 32- 35 °C during the first week, 27 °C during the second, 24 °C during the third, and 25°C afterwards, average relative air humidity of 65-67%; average air movement speed of 0.5-3,5 m/s). The ventilation norm was 10 m<sup>3</sup>/h. The duration of natural lighting within the indoor areas was 10 hours, and the duration of artificial lighting (via electrical lamps) – 14 hours. This was necessary for the proper conducting of their primary socialisation, including the achievement of successful imprinting. After weaning, the dogs were

placed in their actual environmental conditions, in principle (separate semi-open cubicles) consisting of a doghouse and a small yard for walks. The doghouses provided living areas of 3.5 m<sup>2</sup>, and the yards in front of them were with areas of 3 m<sup>2</sup>, therefore the total areas of the cubicles were 6.5 m<sup>2</sup> each. The dogs could freely leave the doghouses and access the yards through an opening in accordance with their sizes. The separating walls between the cubicles were concrete-metal, with the thick concrete part being as high as the dog would be when standing on its hind legs. Above it, the wall consisted of metal bars. Therefore, these walls did not completely separate the dogs from one another (correctly) and at the same time restricted the chances for direct contact and taunting among them (to reduce potential contaminations between them and for greater calm). The construction materials used for the indoor rooms and semi-open cubicles had a low temperature transference ratio – walls (bricks), roof (tiles), floor (bricks).

The animals of both breeds were representatives of the so-called "large" size of dog breeds, which meant that each puppy was given 3-3.5 m<sup>2</sup> of the spaces, in which they would be kept per all sanitary norms.

The average monthly temperature in the cubicles of both dog breeds varied between 18 and 22 °C, while the average humidity was 71 – 73%.

The average monthly air movement speed in the semi-open cubicles was 0.2 – 0.3 m/s.

We did not find any harmful gas content (CO<sub>2</sub>, NH<sub>3</sub>, H<sub>2</sub>S) in the air of the rooms (indoor and semi-open).

Drinking water was freely available from special stainless steel bowls with smooth edges, to prevent any injury. Feeding was twice a day – in the morning and the afternoon, in the same type of bowls as the ones used for drinking.

The animals' walks were singular and conducted within specially prepared enclosure with a concrete floor. Duration was 60 minutes.

Disinfection, disinsection, and deratisation were conducted per the veterinary medical requirements.

Regarding the microclimate conditions the two dog breeds were kept in, we believe that they fully matched the required values, in accordance with the hygiene norms. Their optimal status was explained with the maintenance of excellent hygiene and strict control –

mechanical sweeping of waste from the rooms twice a day, disinfection, as well as regular measurement of the microclimate parameters. Throughout the entire experimental period we aimed towards this relative sameness of the environment factors, preventing any variations which could jeopardise the veracity of our data.

### **Results from the Categorisation of the Nervous System Types of 20 Puppies from both Breeds**

We reached the following results per the Breto method:

- Puppies GS1, GS3, GS4, GS6, GS7, GS8, BS2, BS3, BS4, BS7, BS8 exhibited their behaviour in the presence of two same researchers (for both experiments) and the mirror placed on the floor (in the middle of the room), sufficiently large, rectangular, allowing the puppies to see themselves entirely. From the very beginning the puppies headed (active movement) straight towards the mirror, stood in front of it, went behind it, then returned to its front side, looking around, pushed it with their paws (curiosity: as if they were trying to catch the puppy in the mirror), vocalization (joyful barking), confidence (they moved their tails in a circular pattern). None of them tried to capsize the mirror (stability and security). The unifying quality of all puppies was their high extent of confidence, the lack of fear and anxiety, as well as their purposefulness and curiosity (after an insignificant period of hesitation – 2 or 3 seconds – they headed straight for the mirror). The studied animals with the aforementioned numbers exhibited these behavioural features, which was evidence that all of them possessed the typical characteristics of the strong, stable and plastic sanguine nervous system type (L). These were animals that, when trained properly, developed their primary socialisation without any problems, i.e. there was no need for secondary socialization. The required behavioural model would have developed per the desires and expectation of the human, quickly and successfully, in accordance with the capabilities of the breed, of course;
- Puppies GS2, GS5, BS1, BS5, BS10 also exhibited active movement, hopping swiftly (more active motions), and were so driven to approach the mirror that they capsized it at first, which made us bring it up again. Barking was an

invariable part of their behaviour, with a few small interruptions. The overall impression was that their behaviour was just like the first group, yet we noticed something significantly different. These animals were more mobile, with a higher extent of vocalisation, more impetuous in their desire to “communicate” with the mirror, they were so active that they made it fall over. Once it was put back up, they would stand in front of it again and push it, it would fall over again, and the researcher would bring it back up, etc. We observed a mix of high-degree curiosity, movement, and drive, combined with the puppies’ overall instability. They were not as calm or as “analytical” as the sanguine puppies. Therefore, with such ethological characteristics they could be categorised as the strong, yet unstable choleric nervous system type (F). Therefore, proper training would lead to successful, yet slower primary socialisation due to their instability;

Puppies GS9 and BS6 exhibited significantly different behaviour than everything described so far. At the sight of the mirror, they stopped, moved a little, but did not dare approach it (for 6-7 minutes). After their initial bewilderment and hesitation (not startling), they would head towards the mirror slowly and gradually, sporadically barking against it. At one point they stopped vocalising, went silent, pushed the mirror causing it to fall over, we brought it back up, they would go back and forth again, looked at their reflections, barking occasionally. Thus, we observed slowed motor activity, lack of high-extent curiosity, low-extent slowed drive, as well as low-extent fear, but also persistence. Their fear and hesitation went away after a short amount of time (3-4 minutes). These behavioural characteristics led us to categorise them towards the phlegmatic nervous system type (G) – a weaker and more unstable temperament compared to the preceding two, yet stronger and more stable than the asocial melancholic type (A);

Puppies GS10 and BS9 had very different behaviour, compared to what has been described thus far. They stood indifferent in front of the mirror (at a distance of 2 m), paid no attention to it, merely shaking and whimpering. When encouraged by us (by pushing them towards the mirror) they would bark, whimper

again, stood still, did not demonstrate any movement, curiosity, trust, and they occasionally barked. It was only on the 8<sup>th</sup> minute that they dared to move slightly closer to the mirror, with our help, starting to bark more after seeing their reflected image. Their behaviour was dominated by fear, hesitation, lack of confidence, lack of normal motor activity, curiosity and trust. This led us to categorise these puppies to the so-called melancholic or asocial nervous system type (A) – the hardest to attain primary socialisation, requiring a lot of time for training, fearful and susceptible to aggressive and depressive conditions, if the approach towards it is wrong.

Calculating the summarized results after the conclusion of the first experiment for categorising the temperaments of a total of 20 puppies (80 days of age) from both breeds (GS and BS, 10 of each), we observed the following situation:

- examined sanguine temperament: 2.2%;
- examined choleric temperament: 1%;
- examined phlegmatic temperament: 0.4%;
- melancholic (asocial) temperament: 0.4%

It was apparent that most numerous among the examined puppies were the sanguine ones (2.2%), followed by choleric (1%), and finally phlegmatic and melancholic with 0.4% each.

The results were interesting because the dog owners were elite breeders and conducted high-quality selection with regard to the pedigree of these beautiful and capable animals (guards, odourologists, companions, etc.). We were surprised that, despite the good selection, 0.8% of the studied 20 temperaments turned out to be phlegmatic and melancholic puppies. The presence of phlegmatic temperament puppies (0.4%) was not very disturbing because, first, their percentage was low and, second, we would not describe it as a weak nervous system type due to its relative stability. Still, their training would take more time than it would for sanguine and choleric individuals.

The discovered 0.4% of melancholic puppies were quite a surprise, however. As indicated above, such puppies should not have been born in such a high quality and strictly controlled selection. And yet their occurrence was a fact that warranted further analysis. We should also note that neither of the two farms

conducted categorization of the dogs' nervous systems. The owners were, unfortunately, not familiar with this process, which is typical for a large part of the people involved in this line of work. Thus, they had conducted selection and breeding based on other qualities of the animals (behavioural activities such as movement, curiosity, trust, vocalisation, stability, fear, aggression, etc.), without connection to a specific temperament. A mistake must have been made somewhere along the chain, however – selection of animals for breeding, mating, birth, primary socialisation, upbringing or training. Evidence of this was the existence of 0.8% of phlegmatic and melancholic puppies, even though breeding practice prefers dogs with strong and stable characters, which could quickly and easily be trained for a desired behavioural model. Following this, only these dogs would be used by the owners for breeding, in order to prevent weaker puppies requiring more time for training, which is done most easily during the period of primary socialisation (up to 3 months of age). Yet our current study revealed an entirely different situation, that despite the selection of the dogs in accordance with their behavioural activities (without establishing the nervous system type) there were born puppies, which were hard to train (melancholic and asocial). The percentage was low, and yet apparent.

Tracking the further behavioural development of these animals with established temperament, as well as the remaining 20 for which it remained unknown, we also observed intriguing results, which shall be commented below.

#### **Results on the Dependency between the Examined Temperament and the Ethological Expressions of the Trained Puppies from the Studied Breeds**

Using the "lure" method we received the following data, presented in Table 1.

The results from the table made it clear that no pathoethological activities were observed during the consequent primary training of the dogs with a trainer aware of their nervous system types. (0%). This was due to the fact that every temperament required a specific and clear approach towards the dog during its training period. In this specific case, the trainer knew the characteristics of the 4 nervous system types (sanguine, choleric, phlegmatic, melancholic/asocial). This advantage allowed them to apply the correct approach towards each dog, in accordance with its temperament. The result from the successful

**Table 1: Dependency between the Examined Temperament and the Test Dogs' Behaviour**

Nervous system type (temperament)	Time for primary training towards guard and odourologist behaviour (months)	Pathoethological processes /%
L – sanguine	2	0
F – choleric	2	0
G – phlegmatic	3.5	0
A – melancholic (asocial)	7	0

application of training, with regard to the nervous system type was the lack of non-occurrence of pathoethological symptoms (fear, aggression, depression, etc.) in any of the test dogs whose temperaments were known to the instructor.

And still there is a difference regarding the duration of the training. We found out that work was fastest and most successful with sanguine **L** and choleric **F** puppies (2 months). This was easy to explain, as these were the strong temperaments, with sanguine being more stable than choleric. Dogs with these characteristics were trained very quickly and without problems, by using a specific and determined approach towards them.

Training was longer for the phlegmatic temperament **G**, however. This was considerably slower temperament and the trainer knew it, due to this type being examined and established. These dogs were stable, yet slower to learn a specific behavioural model. Training took a month and a half longer than it did for the previous two temperaments (**L** and **F**), and yet with proper consideration of the peculiarities of the **G** temperament. Therefore, a correct approach towards this nervous system type in terms of time and specifics, as a result of which the dogs were successfully trained and did not develop any pathoethological phenomena.

The melancholic or asocial temperament, which had the greatest difficulty adapting to the environment (slowest socialisation) required the longest primary training (7 months). Applying a determined ethological

model here was very challenging, there was a risk to develop symptomatic pathoethology in case of an improper approach to the animals (most commonly fear and hard to treat aggression). Yet, as indicated in the table, the melancholic puppies did not develop any behavioural conditions. This could be explained with the fact that the trainer was aware of this difficult temperament's peculiarities, and thus applied a specific training coordinated with the nervous system type. As a result of this, training took much longer than it did with the other temperaments, yet without any pathoethology.

#### **Results from Ethological Expressions of the Trained Puppies with unknown Temperaments from both Breeds (GS and BS)**

Using the "lure" method we got the following data presented in Table 2. For greater convenience, we have separated and marked the groups of dogs described in Table 2 with the letters **A**, **B**, **C** and **D**.

It is evident from the presented results that 45%, i.e. 9 of the animals (group A) with unknown temperaments had trained quickly and successfully within two months. These were dogs GS11, GS14, GS15, GS16, GS17, GS18, BS13, BS14, and BS20. We could assume they belonged to the strong sanguine temperament, since its main characteristics were quick acquisition of a behavioural model without the occurrence of pathoethology.

Next were the dogs belonging to the 35 per cent – 7 of them (group B) in Table 2, whose primary training

**Table 2: Dependency between Training and Behaviour of the Puppies with Unknown Temperaments**

Dogs with unknown temperaments (%)	Primary training time (months)	Pathoethology – types (%)
<b>A</b> - 45	2	0
<b>B</b> - 35	2.5	0
<b>C</b> - 15	4	Fear - 6.6% Aggression - 3.3%
<b>D</b> - 5	7.5	Fear, depression, aggression - 3.3%

had been completed without the occurrence of pathoethology but was a little longer than (2.5 months) than group A's. This gave us reason to believe that they were representatives of the so-called choleric nervous system type, which was strong but not as stable as sanguine. These were dogs GS19, GS20, BS11, BS12, BS15, BS16, and BS18.

The dogs from group C made up 15% or 3 animals from the examined subjects with unknown nervous system types. Here we observed two of the most common pathoethologies, fear and aggression (high-extent and various vocalization – howling, whimpering, barking, overexcitement, high-extent motor activity – scratching, tendency to bite), and their training had clearly not been occurred correctly. Fear caused these animals' aggression (GS12, GS13, BS19), a long-established fact. Furthermore, the training towards the desired behavioural model (guards and odontologists) had taken 4 months – a considerably longer time period than seen with the dogs from groups A and B, which meant the ethological model had been built through more persistent and longer training. These two apparent facts – the longer training and the presence of fearful-aggressive pathology were sufficient grounds for counting these animals towards the so-called phlegmatic temperament.

The dogs with unknown temperaments from group D represented 5%, i.e. 1 individual, of the examined animals, in which the training had taken 7.5 months (BS17). This led us to the conclusion that this sole dog was asocial or with a melancholic nervous system type. The long and difficult training was typical for such animals, as well as the development of pathoethology, consisting of fear, aggression, as well as depression, which was often replaced by aggression caused by high-extent fear, after which the dog exhibited severe and hard to treat depressive conditions – lack of any vocalisation, low motor activity, stiff movements, apathy, indifference, lack of attention towards various objects or subjects, tail chasing, prolonged grooming of various body parts.

Comparing the results from Tables 1 and 2, we found out that no pathoethical activities (0%) were observed in the dogs with categorised nervous system types, whereas among the ones with unknown temperaments we observed 13.2% of pathoethical conditions – fear, aggression, and depression. This could be explained with the fact that in the cases of a categorised nervous system types the trainer knew what approach to apply to the different dogs. If they

had been melancholic, the trainer would not have been hasty to teach specific behavioural models, since they lacked the biological potential for it. Sanguine and choleric dogs learned quickly, but the melancholic ones required special attention. If the trainer was unaware of their temperaments, they would have expected the same results (learning specific behaviour over a certain period of time) from all dogs in the same way. Yet the dogs did not have the same temperaments. Properly conducted selection indeed led to the births of dogs with predominantly strong temperaments (sanguine and choleric), yet the facts indicated that, even if to a lesser extent, phlegmatic and melancholic puppies were born. Therefore, if the owners were unaware of the animals' temperaments (as is usually the case), they would have applied an incorrect approach towards them and expected them to learn the desired behaviour over the same period of time. Most of them would have succeeded, but there would always be those that required special attention. And if that didn't happen, they would have developed pathoethology, as described above, which would be hard to remedy since it affects the dog's psyche. In such cases, therapy results were often unsuccessful.

This would raise the question of what to do with these animals – dispose of them by sending them to a shelter, giving them to other owners, or even abandoning them? The latter is not a solution, as abandoned animals often become a part of the already large stray dog population, which causes various problems. The final decision depends, to a great extent, on the owner's animalistic culture.

Therefore, in order to reduce such situations, it would be necessary to introduce mandatory categorisation of the nervous system types (Temperament) of newborn dogs, as knowing it would allow the owners to apply a correct approach to them, coordinated with peculiarities, while also avoiding the bothersome and hard to treat pathoethology, which would impede their overall development. This endeavour, however, is still underestimated by veterinarians in many countries, while owners rely solely on a properly conducted selection, through which they do not allow dogs not meeting the respective breed standards to procreate. As we found in this particular experiment, however, proper selection is not a sufficient factor to avoid the occurrence of pathoethical activities while raising and training the dog. Therefore, taking into account the modern concept of complete provision of welfare, it should be mandatory to introduce categorisation of the dog's

temperament, in order to ensure proper training approach, and avoid the development of pathoethiology.

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