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Animal Science 310 – Behavior and Management of Domestic Animals

Tail Wagging and Emotional Response to Different Stimuli

Introduction

There are many observed cases where dogs that are very nervous, frightened or even agitated wagged their tails. This behavior seems odd because when a dog is wagging its' tail it is generally believed to be an open invitation to pet the animal. However, this is not the case, as is shown by the nearly 4.7 million dog bites each year (Phillips 2008). In many of these cases the dog was wagging its' tail when it was initially approached. Tail wagging can be a sign of dominance that is not conveyed well to humans. This behavior, coupled with a study done on right and left brain emotional asymmetry (Batty and Taylor, 2003), stimulated me to do more research on tail wagging and asymmetry in dogs. A recent study by Nichols et al. (1999) in humans used a new imaging method to investigate facial movement in three dimensions to assess possible asymmetrical action during expressions of happiness and sadness. It was discovered that sadness and negative emotions were more pronounced on the left side of the face. This seems to point to these emotions being controlled by the right side of the brain. Also, happiness or positive emotions were more pronounced on the right side of the face suggesting a left brain control center (Davidson et al., 2004). Studies by Quaranta et al. (2007) and Davidson et al. (1990) found different electrical activity in the two hemispheres of the brain during different emotive experiences.

The objective of this experiment was to determine if tail wagging in dogs differed with emotional state and to determine if right and left brain emotional asymmetry may apply. The findings may help to reduce the large number of unwarranted dog bites each year.

Procedure

To determine whether tail wagging is related to emotional expression a 6' x 3' x 4' wooden box was constructed and completely wrapped in black plastic to allow no outside light to penetrate the box. In one end of the box an 8" x 8" viewing slot was cut through which test subjects could view a stimulus. A camera was mounted in the top of the box above the viewing slot to record the tail wag of the subject for later digital analysis. The experiment was conducted in College Station, Texas and was run over a period of about five and one half weeks to allow time for the box to air out between subjects. The project was started in early October and ran through November 16th. The time of day was varied between 8:00am and 9:00pm on trial days, but is irrelevant due to the box being blacked out so no outside light was able to enter.

The test subjects were exposed to three different stimuli: two negative and one positive. The negative stimuli used were an alpha dog and a male human not previously known to the test subject. The positive stimulus was introduced last and was the subject's owner.

Four adult subjects were chosen for the project. Subject A was a ten year old spayed female Border Collie. Subject B was a seven year old spayed female Golden

Retriever. Subject C was an eight year old intact male Chocolate Labrador Retriever. Subject D was a two year old intact male Bluetick Coonhound.

The dogs were placed in the test box one at a time and exposed to the three different stimuli through the viewing slot. The first stimulus used was the alpha dog. The camera was turned on and the first stimulus was placed in front of the viewing slot for the subject to observe for thirty seconds. After thirty seconds the slot was closed and five minutes was given for the subject to calm down. Then the second negative stimulus was introduced. The human stranger was placed in front of the slot for the allotted thirty seconds. After thirty seconds, the slot was closed and the subject was again given five minutes to calm down. Then the owner was placed in front of the viewing slot for thirty seconds for the subject to observe. The positive stimulus of the owner was introduced last to try and minimize the subject from associating either of the other stimuli with their owner, which could have had an effect on the results. The owner was introduced for thirty seconds and then removed. Each of these steps was repeated four times for each subject.

Once the data for all four subjects was collected, the video was loaded onto video editing software for further analysis. The video was frozen and still photos captured of the subjects tail wag from the maximum angle on the left and the maximum angle on the right. A straight line was then drawn from between the shoulder blades straight through the base of the tail for a point of reference. Then a line was drawn from the tail base straight through the tip of the tail at its maximum deflection or “wag angle”. The angle was recorded in degrees along with whether it was on the left or right side of the dog, and the data placed into a chart. This procedure was followed for all four trials on each of the four subjects.

Results

The data in Table 1 shows that when each of the four subjects was introduced to a stimulus the measurable angle of the tail wag was very different. When exposed to the negative stimulus of the alpha dog the four subjects had a left leaning wag that was on average 31.25 degrees more than their right leaning wag (Table 1, Fig. 1). This strong trend was observed in each of the four trials.

Table 1. The average difference between the maximum left and right deflection for each subject for the four trials. Whether the dog had a left or right leaning wag is also shown.

Subject	**Alpha Dog**	**Stranger**	**Owner**
A	**27**	**30**	**35**
B	**43**	**47**	**52**
C	**40**	**53**	**32**
D	**15**	**14**	**11**
Average	**31.25**	**36**	**32.5**
	Left Leaning Wag (In Degrees)	**Left Leaning Wag (In Degrees)**	**Right Leaning Wag (In Degrees)**

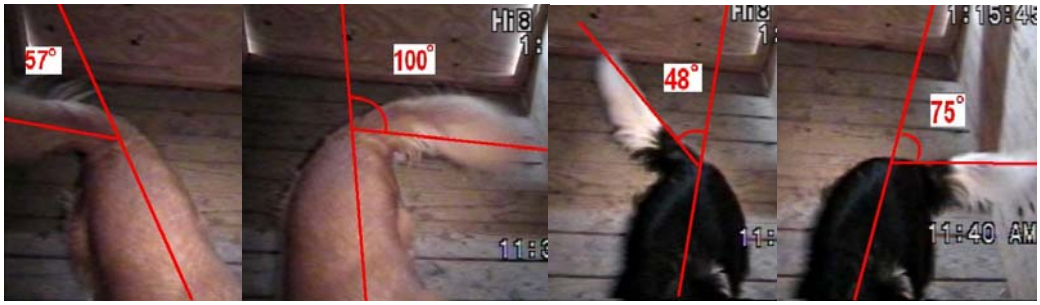

Figure 1. Typical angles showing difference in left and right wag when subjects were shown the negative stimulus “Alpha dog”.

When the subjects were exposed to the negative stimulus of the human male stranger, the left leaning wag was on average 36 degrees more than the right leaning wag (Table 1, Fig. 2). There was also notable aggression displayed by subject A and subject C when exposed to the male stranger. They displayed the left leaning wag while using a low growl to convey their emotion. Subject A also used a series of low short barks to display aggression.

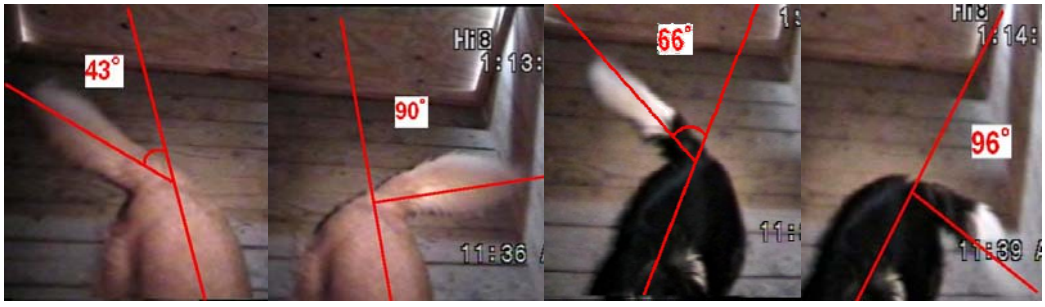

Figure 2. Typical angles showing difference in left and right wag when subjects were shown the negative stimulus “Human male stranger”.

When the subjects were exposed to the positive stimulus of their owner, the response was far different than that of the previous two trials. The tail now had a very prevalent right leaning wag that was on average 32.5 degrees more than the left leaning wag (Table 1, Fig 3).

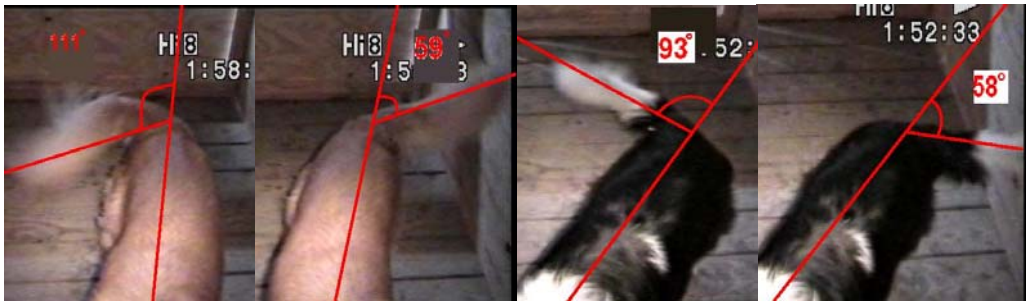

Figure 3. Typical angles showing difference in left and right wag when subjects were shown the positive stimulus “Owner”.

Discussion and Conclusions

The data that was collected matched, in theory, the only other study available on emotional based asymmetrical tail wagging. That study was carried out by Quaranta et al. (2007) and was done using similar stimuli to that used in this experiment. Quaranta et al. (2007) also found a left leaning wag when exposed to negative stimuli and right leaning wags with positive stimuli. This study is extremely important in bringing light to the fact that dogs do not just wag their tail in a happy excited state. It can be a sign of nervousness or fear and it is in these situations when dog bite risk is greatly increased. When looking at human dog bite statistics, about 42% of reported bites are to children 14 years and younger (Snyder, 2001). The actual number of bites may be larger due to parents over-reacting to their child being bitten. In many cases adults will not go to the doctor unless they absolutely need to. The misunderstanding as to what a dog is feeling contributes greatly to the high amount of domestic dog bites in the United States.

There were a few limitations in this study that restricted me from getting the amount of data I would have liked to collect. One of the major obstacles was money. The box used to hold the subjects for the experiment was costly and took the majority of the

money I had available for the project. Also, time inhibited some of the other aspects of the project. I would have liked to have exposed each of the subjects to more stimuli, including a prey animal. Another aspect I would like to study would be the height and speed of the tail when exposed to the stimulus, and how tail speed was correlated with the angle of the wag in each of the trials.

The data collected in this study along with the published research on both tail wagging and left-right brain asymmetry, show that there is powerful evidence for the theory that emotional processing is differently localized in the two hemispheres of the brain. Asymmetry in tail wagging could be very easily incorporated into welfare and behavior study in veterinary medicine to estimate positive and negative emotions that are rarely seen or understood in dogs.

Literature Cited

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