Reason for dog's responses towards ringing of keys

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Abstract

Domestic dogs (*Canis* familiaris) are social canids that display distinct behaviors either to other dogs or human beings[1], also they are one of the most common animals raised by humans as pets. As walking dogs may improve their compliance[2] and is beneficial for their health, my family has long been keeping the habit of walking our dogs twice a day. My family keeps two dogs as pets, we noticed that sometimes they give very active responses when keys are ringing, like barking, breathing quickly and hard, running in circles and making noises. In this research, the reason why pet dogs act excitedly in response to ringing of keys is studied and discussed. Two hypotheses are proposed to explain the reason for dogs' overreactions. The first one is that we often grab our keys, which leads to ringing of keys before we decide to walk the dogs. Since we have been doing this for many years, they may have learned that ringing of keys is a signal of going out, which makes them excited. In other words, the ringing of the keys acquires the capacity to evoke their overreactions that are originally evoked by the chances of going out due to the mechanism of classical conditioning. The other one is that dogs are alert and could readily overreact on sharp and loud noise.
Key words: Domestic dogs, Overreaction, Stimulus, Statistical analysis.

Method

A 15 days long experiment is designed to verify the hypotheses mentioned above. In the first five days, the ringing of keys is used as the stimulus in experiments. Dogs are able to see me and hear the ringing clearly. Considering they usually get a morning walk at around 9 am and a night walk at around 9 pm, these experiments are done on 5 different times of a day, which are respectively 9 am (before the morning walk, so the possibility to get outside is huge), 10 am (about 10 minutes after their morning walk, so it is basically impossible to get another chance to hang out), 2 pm (several hours after the last walk, they get more possibility to go out but still not likely to do so), 9 pm (before the night walk, it is very possible to go out at roughly this time), 10 pm (not long after they come back home, they get hardly any chance to go out). To find out whether they get excited on getting outside instead of the ringing itself, in the next experiment ringing of keys is replaced by another possible signal of going outside. If the first hypothesis is true, then they would act similarly as in the first 5-day experiment. The next 5-day experiment shares the same time point as the first one but the ringing of keys is substituted

by letting them see me wearing a mask, which serves as the new stimulus. In the last five days, experiments are designed to tell whether or not the dogs are naturally sensitive to loud and sharp noise, where the stimulus is another kind of loud and sharp noise played via a smartphone. Also, in order to measure quantitatively to what extent the dogs are excited, an evaluating standard is set empirically (based on personal understanding of their behaviors), where 0, 10, 20, 30 and 40 stand for 'No reaction', 'Paying attention', 'Breathing quickly and hard', 'Running in circles' and 'Barking', in respective order. If two or more behaviors of them are displayed at the same time, the number will be the highest one representing the corresponding behavior instead of accumulating. (e.g. when the dogs are barking as well as running in circles, number for this trial should be 40 instead of 70 or any other number.)

Result

The original record of this 15-day experiment is displayed (Table 1).

stimulus	9 am	10 am	1 pm	9 pm	10 pm
Keys ring	30	10	10	30	10
	30	10	10	30	0
	40	10	20	40	10
	30	10	20	30	10
	30	10	20	40	10
Wearing a mask	20	20	30	30	10
	30	0	10	40	10
	40	10	20	30	20
	30	20	20	40	10
	40	20	10	40	10
Another kind of loud and sharp noise	10	0	0	0	0
	0	10	0	0	10
	10	0	10	0	0
	0	0	0	0	0
	0	0	0	10	0

Table 1 Original record of the experiment

Analysis and Conclusion

As is mentioned above, the dogs get roughly the same possibility of going out at 9am and 9pm, which is high. Similarly, they also get roughly equal possibility at 10am and 10pm, which is low. At 1pm, the chance of going out should be between that of 9am/9pm and 10am/10pm, which means their possibility of going out is medium. Thus, while arranging statistics of this experiment, data from 9am and 9pm are classified into 'High possibility' group and data from 10am and 10pm are classified into 'low possibility' group (Figure 1). The statistics are later

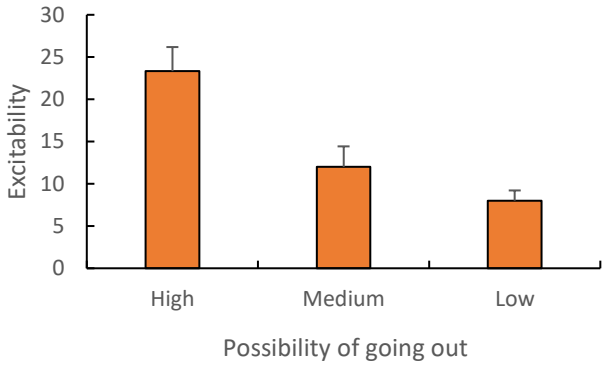

Figure 1 Dogs' excitability in different conditions

analyzed in SPSS and the corresponding result is shown in Table 2.

Possibility of going out	n	$\bar{x} \pm s$	F	p
High	30	23.33 ± 2.85		
Medium	15	12.00 ± 2.43	13.849	0.000
Low	30	8.00 ± 1.21		

Table 2 Result A of one-way analysis of variance

With p-value less than 0.01 and the outcome in ensuing LSD (Least Significant Difference) test, the result of one-way analysis of variance manifests that the excitability values of dogs are significantly different in 'High possibility' group and in 'Low possibility' group. This result also validates the hypothesis of 'Dogs take ringing of keys as a signal of going out, which makes them excited'.

In addition, relationship between dogs' excitability and different stimuli are examined in Figure

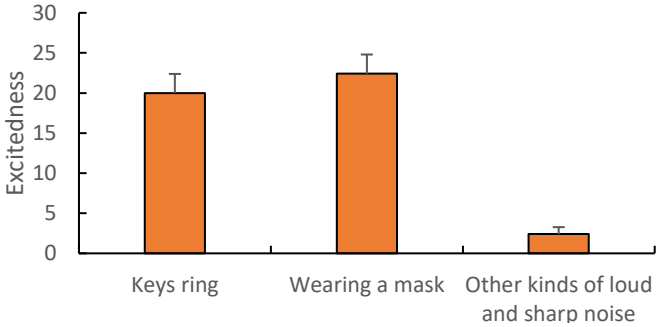

Figure 2 Dogs' excitability in different stimulus

2. Still, SPSS is used to analyze the statistics and the result is displayed in Table 3. In this analysis, p-value is still less than 0.01, which means the difference among stimuli is significant. However, considering the result of LSD test (Table 4), we can tell that there is no significant difference between 'Keys ring' and 'Wearing a mask', either of which gives significant larger rise to dogs' excitability than 'Another noise'. So, this outcome indicates that the hypothesis of 'dogs are generally sensitive to loud and sharp noises' should be wrong.

Stimulus	n	$\bar{x} \pm s$	F	p
Keys ring	25	20.00 ± 2.38		
Wearing a mask	25	22.40 ± 2.40	29.357	0.000
Another noise	25	2.40 ± 0.87		

Table 3 Result B of one-way analysis of variance

		Mean			95% Confidence Interval	
(I) Stimulus	(J) Stimulus	Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
1	2	-2.40000	2.85034	.403	-8.0821	3.2821
	3	17.60000*	2.85034	.000	11.9179	23.2821
2	1	2.40000	2.85034	.403	-3.2821	8.0821
	3	20.00000*	2.85034	.000	14.3179	25.6821
3	1	-17.60000*	2.85034	.000	-23.2821	-11.9179
	2	-20.00000*	2.85034	.000	-25.6821	-14.3179

Table 4 Result of LSD test. * The mean difference is significant at the 0.05 level. Stimulus 1 refers to 'Keys ring', stimulus 2 refers to 'Wearing a mask' and stimulus 3 refers to 'Another noise'.

In conclusion, dogs' overreactions are more likely because certain events represent a high possibility of going out.

Discussion

In this study, the reason for dogs' overreaction is researched mainly via statistical analysis, which makes the result more convincing. Nevertheless, due to the limitation of time for this experiment, there is not enough time interval between each 5-day experiment, which may result in a larger error range since different stimuli may have distinct influences on dogs. Besides, continuous exertion of the same stimulus may also influence the ensuing experiments. In the first analysis of the statistics, the corresponding LSD test gives out a result indicating that there is no significant difference between 'Medium possibility' group and 'Low possibility' group, while the 'High possibility' group is significantly different from them. This outcome is not ideal and the standard set for evaluating dogs' excitability should be ameliorated, but it is difficult to set up an evaluation system containing no personal perspective.

Reference

[1] M.S. Howse, R.E. Anderson, C.J. Walsh, Social behaviour of domestic dogs (Canis familiaris) in a public off-leash dog park, Behavioural Processes 157 (2018) 691-701.
[2] L.M. Wauthier, A. Scottish Society for the Prevention of Cruelty to, J.M. Williams, Using the mini C-BARQ to investigate the effects of puppy farming on dog behaviour, Applied Animal Behaviour Science 206 (2018) 75-86.