## Does ASMR have a relaxing effect on mice?

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#### Purpose

In recent years, ASMR has become a hot topic.ASMR is a sound source that causes a relaxing effect on the human brain through stimulation of the human auditory system. However, the cause of this effect has not been clearly elucidated, and it is thought that the placebo effect may be the cause of ASMR's relaxing effect. The purpose of this experiment is to examine whether the placebo effect or the characteristics of ASMR are responsible for the relaxing effect that ASMR has on humans.The hypothesis is that ASMR has a relaxing effect on mice.

#### Experimental Method ①

#### Outline of Experiment

In this experiment, mice were exposed to ASMR and a comparison music for 3 minutes each. Regarding the measurement of the relaxation effect seen in the mice, we decided to use the distance the mice traveled for 3 minutes as an index of relaxation, because we believed there was a positive correlation between the degree of relaxation and the distance they traveled. Mice were placed in the cardboard boxes shown in Figure 1.The experiments was used as the distance traveled.

#### Preparations

Three fancy rats (Rattus norvegicus) were used for the experiment. The following 5 types of ASMR are prepared as sound sources for the mice to listen to.

<ASMR>

Natural sound (<u>https://youtu.be/Z76yszlGWCk</u>)

Soda water sound · sound of touching the microphone
(https://youtu.be/8GYpz-OesEQ)

<Music for comparison >

Weightless (<u>https://youtu.be/UfcAVejslrU</u>)

Classical music (<u>https://youtu.be/PTr1v1ksWkO</u>)

Weightless is a scientifically based music that relaxes the human heart by synchronizing the heartbeat with the tempo of the music.

#### Measurement method of the experiment

The measurement of mouse movement distance was done by creating a self-made program using the programming language Python. The program divided a 3-minute movie into 3 images per second for a total of 1800 images, extracted the mouse from the images using the HSV color space, then, it calculated the difference in the coordinates of the center of the mouse's body in the previous and next frames, and added them together to measure the distance traveled. The unit here is pixel.

#### Calculation of the degree of relaxation of the sound source

In order to compare the distance the mice traveled, we considered that the physical strength of the mice would decrease over time, which would result in a decrease in the distance the mice traveled. Therefore, we calculated and compared the degree of relaxation value for each sound source using the following method. We measured the distance traveled by the mice in the normal state for 3 minutes before and after listening to 5 different sound sources in the same way, and connected the before and after values with a straight line as shown in Graph 1. For each sound source, the value of the straight line minus the distance traveled is calculated for each of Individuals A, B, and C, and the sum of these values is considered to be the relaxation value of each sound source. The larger the relaxation value, the more relaxing the effect.



Figure1



Figure2 A sound source is played and a mouse is moving inside a cardboard box.

Extracting the mouse from the image in Figure 2 using a program of my own making, with the center indicated by a white circle.



#### **Consideration**

Comparing the degree of relaxation of each sound source calculated from the results of experiment (i),we can say that Weightless has no relaxing effect on the mice because its value is too small. In addition, as the top three sound sources were occupied by ASMR sound sources, we can say that ASMR had a relaxing effect on the mice. Therefore, it can be considered that the placebo effect is not the cause of ASMR's relaxing effect on humans. Regarding the cause of the relaxing effect of ASMR on mice, we considered that it was mainly due to the timbre and volume of the sound sources. With regard to timbre, we aline the sound volume of each sound source to a constant level and compare the waveforms which break them down into their frequency components by using a Spectrum Analyzer.The following are the results.



The waveform of ASMR can be seen to be rounded, with the volume increasing around certain frequencies. In contrast, the waveforms of the comparative sound source have a variety of loudness in each frequency band and are prominent. Therefore, we considered that the roundedness of the waveform was the cause of the relaxing effect. We also considered the sound source of carbonated water,which has the highest degree of relaxation, from the perspective of sound volume. The volume of carbonated water was about 85 dB, while the volume of ther sound sources was about 100 dB. If the 85 dB volume of the soda water alone is responsible for the relaxing effect, then the same effect should be produced when the other sound sources are all at the same volume. Based on this consideration, Experiment<sup>(2)</sup> was conducted.

#### Experimental Method<sup>2</sup>

#### Outline of Experiment

The volume of the Weightless sound source is adjusted to 85 dB and the degree of relaxation was examined. We select Weightless because the degree of relaxation in the normal state is equal to zero, and we can compare easily. **Result of Experiment** (2)

Graph3 Volume Comparison

Graph4 Relaxation



#### Consideration 2

The results suggest that one factor alone, the loudness of the sound at 85 dB, is not the cause of the relaxing effect. Therefore, the cause of the relaxing effect of carbonated water on mice can be narrowed down to four factors. (1) The loudness of the sound combined with other sound elements, such as the pitch or timbre of the sound, produces a synergistic effect. ((2)) Tone is the cause. ((3)) The height and timbre of the sound combine to produce a synergistic effect. ((4)) All three elements of sound are combined to produce a synergistic effect. As a future prospect, we would like to conduct the same experiment as Experiment ((2) on height, one of the three elements of sound, and further consider the cause of the relaxation effect.

#### References

#### () Proof that ASMR has a relaxing effect on humans.

More than a feeling: Autonomous sensory meridian response (ASMR) is characterized by reliable changes in affect and physiology j by Giulia Lara Poerio , Emma Blakey, Thomas J. Hostler, Theresa Veltri

	音源比較1		右上(A)	左上	:(B)	(B) 右下(C)	
	通常物	犬態(実験前)	13897.538	210	83.159	17352.52	26
	ウェイ	イトレス	12392.654	178	80.186	14358.60	)8
	クラシ	ィック	11583.743	155	58.532	9872.085	55
	自然音	5 1	8324.2636	14	536.61	8595.421	12
	炭酸7	k	8270.5185	151	91.703	8314.878	38
	マイク	7 叩き	11217.393	835	0.2129	9768.886	59
	通常物	犬態(実験後)	9672.6888	166	90.289	11731.11	16
音源比較2 存		右上(A)	左上(B)	) 右下		(C)	
通常状態(実験前)		13662.841	18545.2	279	112	20.301	
ウェイトレス		18608.76	15977.2	204	120	66.774	
クラシック		11189.088	15796	.71	101	03.007	
自然音		11411.052	14710.0	067	986	6.6417	
炭酸水		3113.3643	13590.0	082	829	3.2459	
マイク叩き		11704.555	7615.88	852	879	6.7488	
通常状態(実験後	Ź)	13988.915	14259.0	001	610	4.6217	

音量比較	右上(A)	左上(B)	右下(C)
通常状態(実験前)	9903.3236	15032.509	20923.821
小音ウェイトレス	17185.482	13874.531	17759.342
通常状態(実験後)	×	10032.981	19772.402

速度比較	右上(A)
通常状態(実験前)	13565.682
10倍ピッチ未修正	11206.016
10倍ピッチ修正	10913.764
通常状態(実験後)	11848.623

- (実験概要?) 85dBの大きさに合わせたWeightlessを 用いて実験.
- (結果?)元の音の大きさのWeightlessと85dBの
   Weightlessの間にリラックス度合い (n)に大きな違いは見られなかった.
- 考察(2) 結果より85dBである音の大きさという一つの 要素のみでリラックス効果の原因にはならないと考え られる. そこで炭酸水がマウスに対してリラックス 効果をもたらす原因は五つに絞られる. 一つ目は音の 大きさと他の音の要素である音の高さもしくは音色が 合わさって相乗効果を生んでいる.二つ目は が原因である.三つ目は音色が原因である. つ目は音の高さ 四つ目は 音色が合わさって相乗効果を生んでいる 音の高さ、 五つ目は音の三要素全てが合わさって相乗効果を生んでいる。結果より85dBである音の大きさと の要素のみで 果の いう ス効 ならないと考 Z られ で炭酸水が マウスに対 ックス効 7 果をもたらす原因は五つに絞られる は音の大きさと他の音の要素である 音の高さもしくは音色が合わさって相乗 効果を生んでいる.

### <u>ASMRはマウスにリラックス効果を及ぼすのか</u>

兵庫県立神戸高等学校 総合理学科 1年 番場大誠 鈴木嵩人 濵野晃吉 藤林紫苑 宮下透 森嶋理人

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実験 1回目

■右上(A) ■左上(B) ■右下(C)



実験 2回目











速度比較



# Graph 4 relaxation





