ITNT 2021

Problem #13

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#13

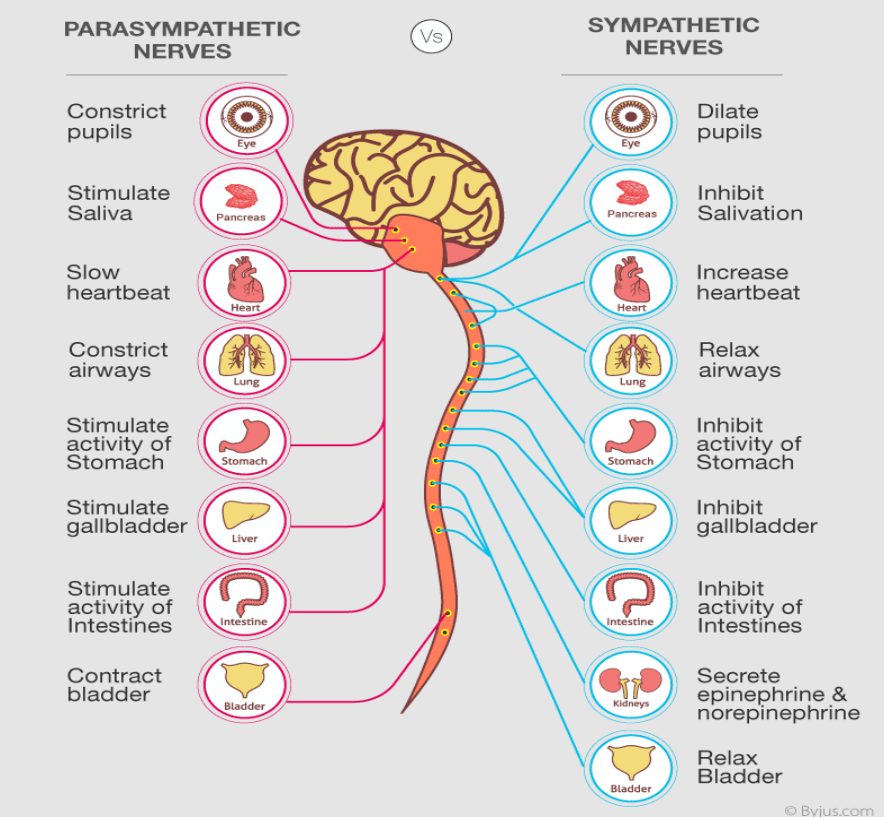
13. investigate how different genres of movies can affect human mind and skin conductance.

Outline:

- Phenomenon explanation
- Theoretical model

1. Biological explanation
2. Physical explanation

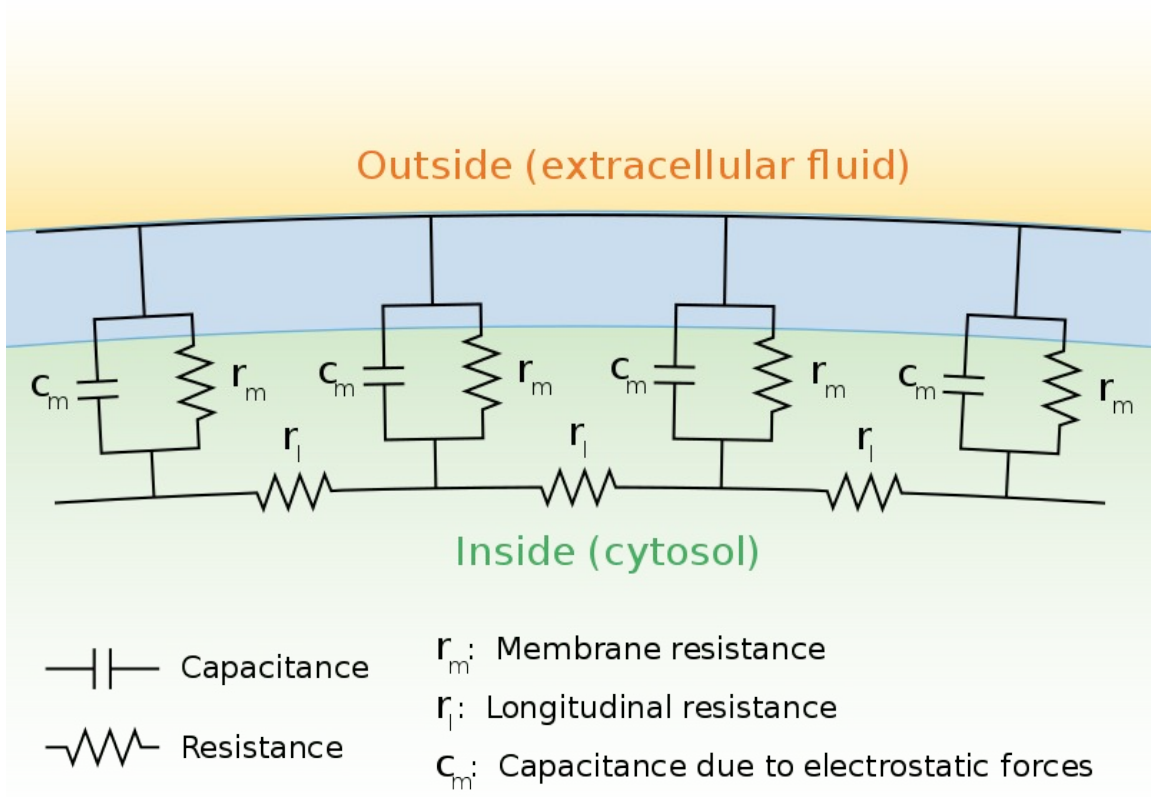
- Experiments

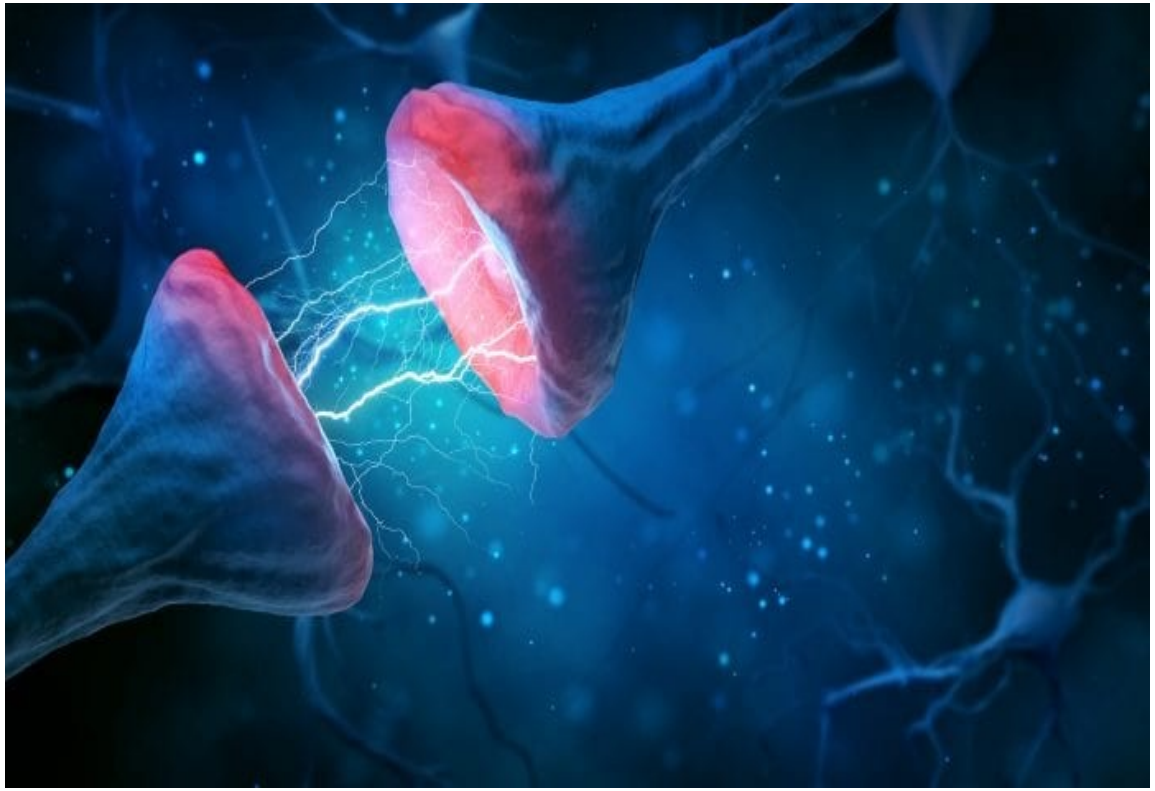


The autonomic nervous system controls specific body processes, such as circulation of blood, digestion, breathing, urination, heartbeat, etc.

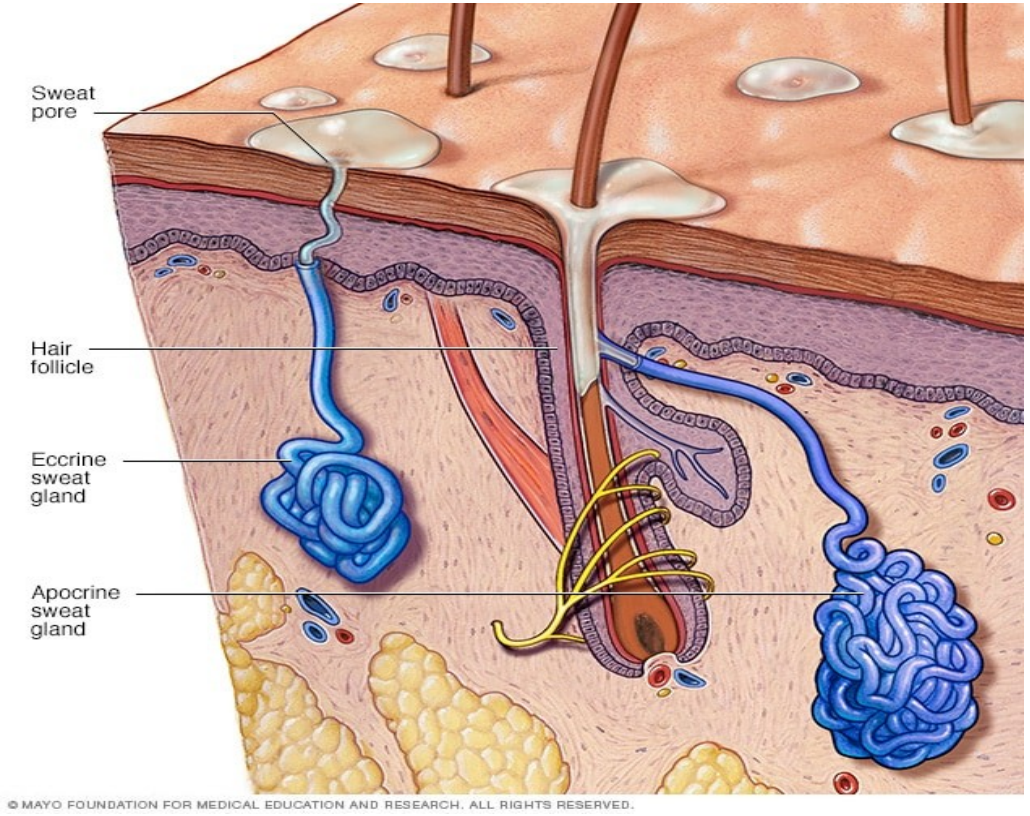
1.Sympathetic autonomic nervous system
2.Parasympathetic autonomic nervous system

Why does the psychological factor change skin conductivity?

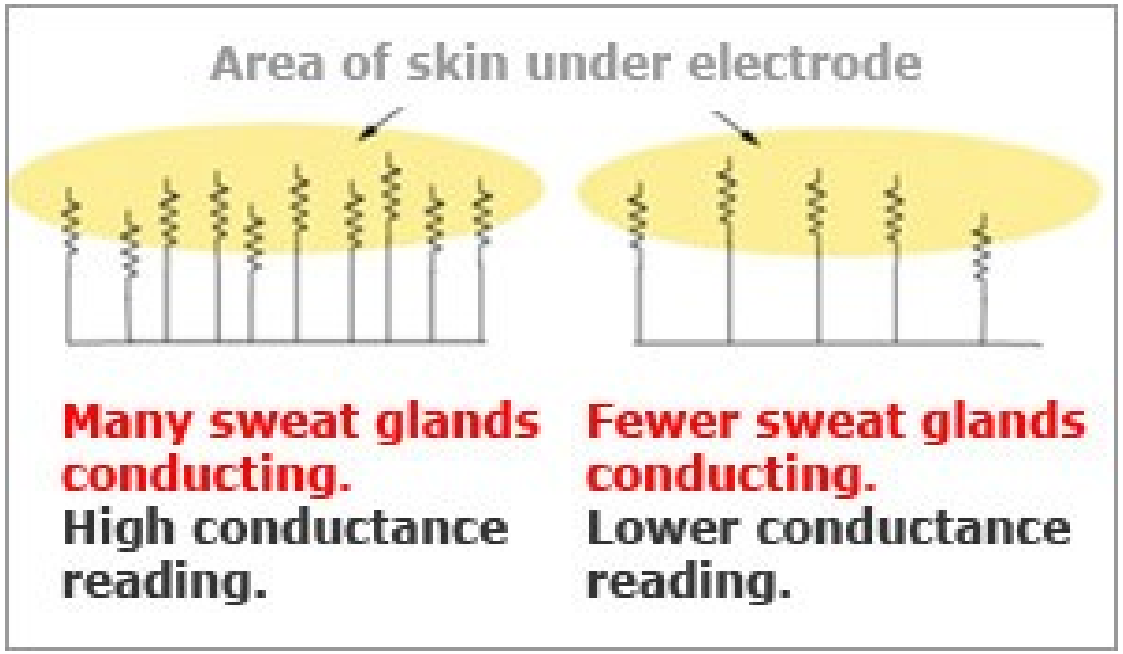




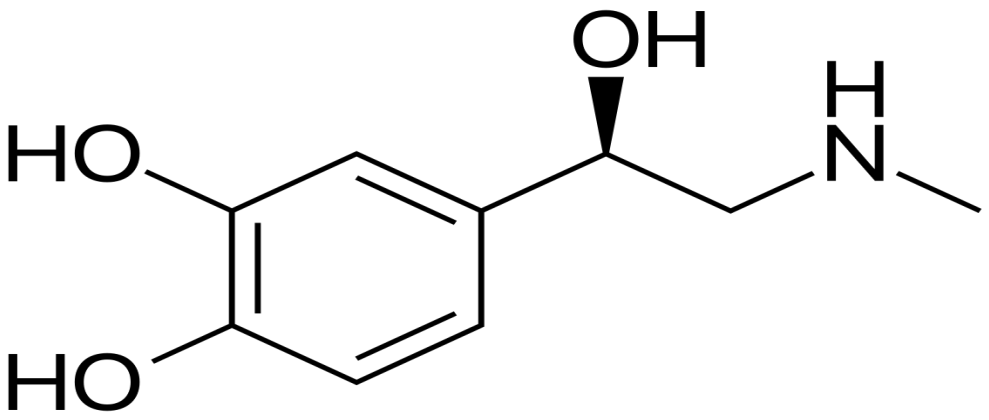
Human glands



There are two types of glands. These are eccrine and apocrine glands.

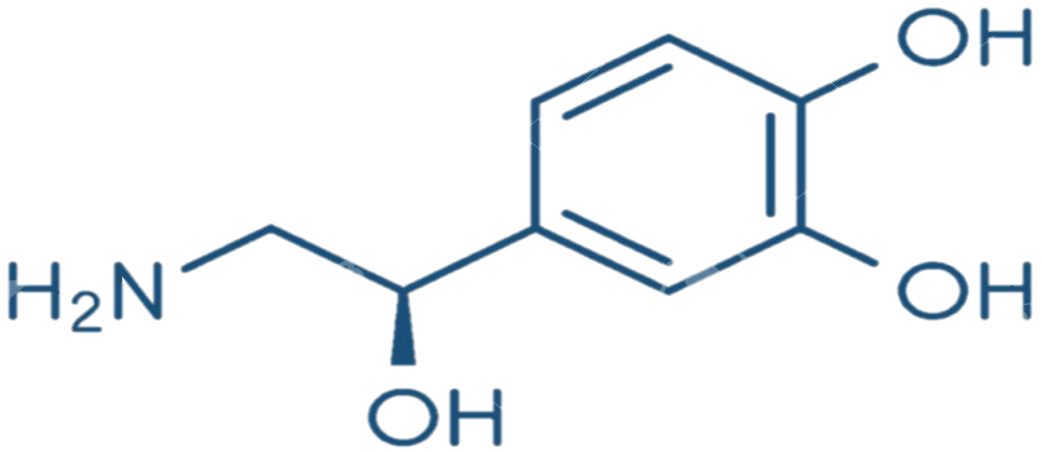


can hormones affect on skin conductance?



As the hormones move to the blood, the vassals close that's one of the reasons why the sweat appears on human skin.

Even though noradrenaline's function is different from adrenaline's, they have the same effect on skin conductance



Eccrine glands

- A sweat gland, that secrets a viscous fluid into a hair follicle.
- Occur in armpits and perianal areas in humans.
- Secretion consists of proteins and fatty acids.

Apocrine glands

- A type of simple sweat glands, which is found in almost all regions of skin
- Occur all over the skin.
- Secretion consists of water and sodium chloride.

$$U = E\,L$$

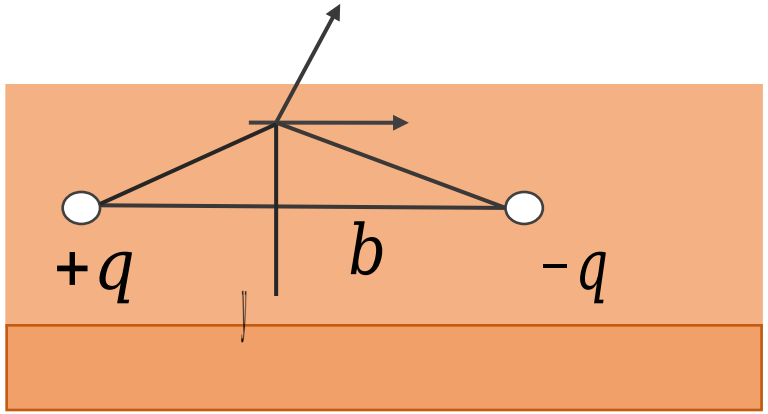
$$R = \frac{\rho L}{S}$$

$$U = IR$$

$$\frac{\rho L I}{S} = E L$$

$$\frac{U}{I} = R = \frac{\rho}{\pi R}$$

$$E = \rho\, J$$



$$E_y = \frac{2kq}{y^2+b^2} x \frac{b}{\sqrt{y^2+b^2}} = \frac{q\,b}{2\pi\varepsilon_0 \frac{(y^2+mb^2)^3}{2}}$$

x

$$I = \int \frac{qh}{2\pi\varepsilon_0 \varepsilon bp} x \frac{d\frac{y}{b}}{¿¿}$$

$$I = \frac{qh}{\pi\varepsilon_0 bp}$$

$$\frac{q}{2\pi\varepsilon_0 r} = U$$

$$p = \frac{1}{R}$$

$$R_{whole} = \frac{R_{sweat} R_{skin}}{R_{sweat} + R_{skin}}$$

$$b = \frac{L}{2}$$

Radius of contact point

$$R = \frac{\rho_{skin} \rho b}{\rho_{skin} 2hr + \rho \pi b \pi r}$$

$$R = \frac{L \lambda_n \rho}{\rho_{skin} 4hr + \rho L \pi r}$$

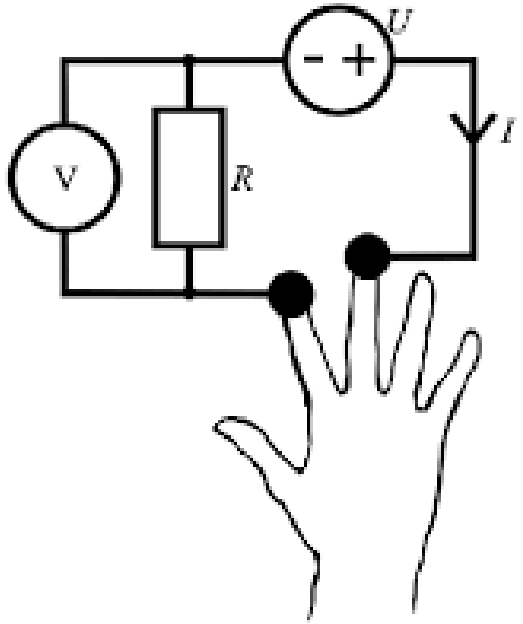
For measuring the resistance, we used a multimeter

Factors that can affect on our problem

- The environment should be controllable;
- During an experiment, we should maintain a constant, Optimal temperature for humans;
- In the environment, there shouldn't be any disturbing noises or images;
- Before the experiment, volunteers should adapt to the given environment;
- The observation should start 5 minutes later from putting the electrodes at human palms;
- Age and gender of the volunteers.

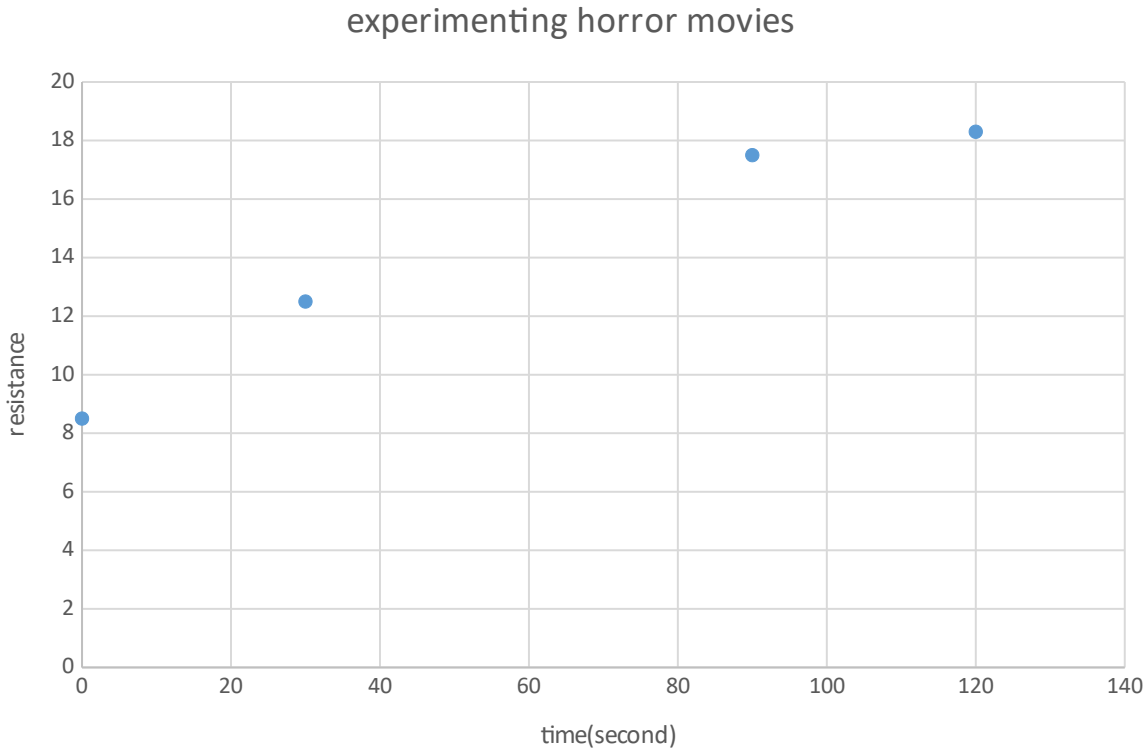
Experiment#1

In our experiment, we decided to investigate how different genres of movies could affect on human skin conductance.



Testing horror movies

K ohms

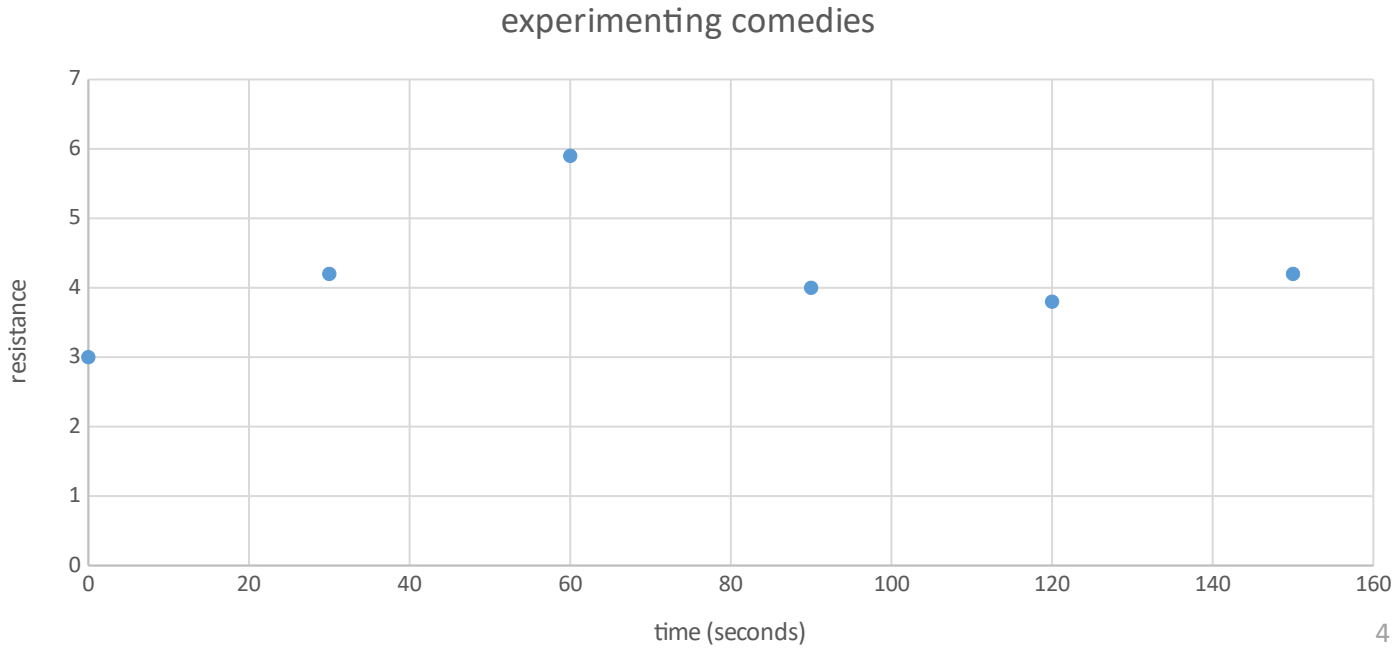


Due to the fact every human has different number of resistance, we decided to measure the relative shift.

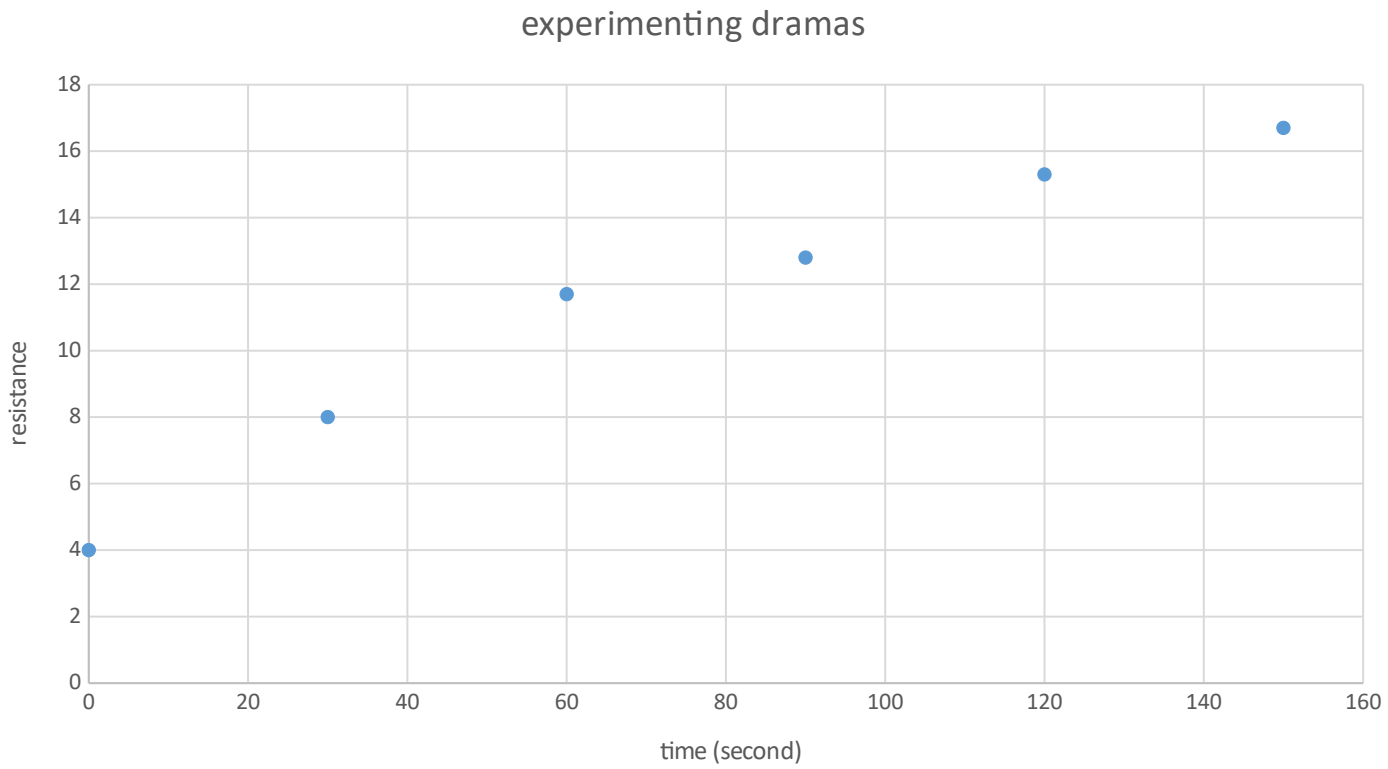
During time, skin resistance decreased

Testing comedy movies

As the skin resistance increase, the conductance of the skin decreases



Experimenting dramatic movies



As the resistance increases, the conductance gets lower.

Interesting factors:

- While measuring skin resistance, the numbers were changing speedily, which is caused by the unstable psychological condition;
- We measured our volunteers' skin resistance while they were asleep. The numbers of resistance changed a little, or didn't change at all, so we come to the conclusion that human skin resistance, as well as skin conductance is depended on psychological condition.
- Skin conductance is constant, while sleeping.

Conclusion:

$$R = \frac{L \lambda_n \rho}{\rho_{skin} 4hr + \rho L \pi r}$$

- Skin conductance is depended on Age and gender;
- While measuring skin resistance, the numbers were changing speedily, which is caused by the unstable psychological condition;
- We measured our volunteers' skin resistance while they were asleep. The numbers of resistance changed a little, or didn't change at all, so we come to the conclusion that human skin resistance, as well as skin conductance is depended on psychological condition.
- Skin conductance is constant, while sleeping.

Thanks for your attention