

7. Clicking Fingers

Snapping one's fingers results in a *loud popping sound*. Investigate the *nature* and *properties* of this sound.

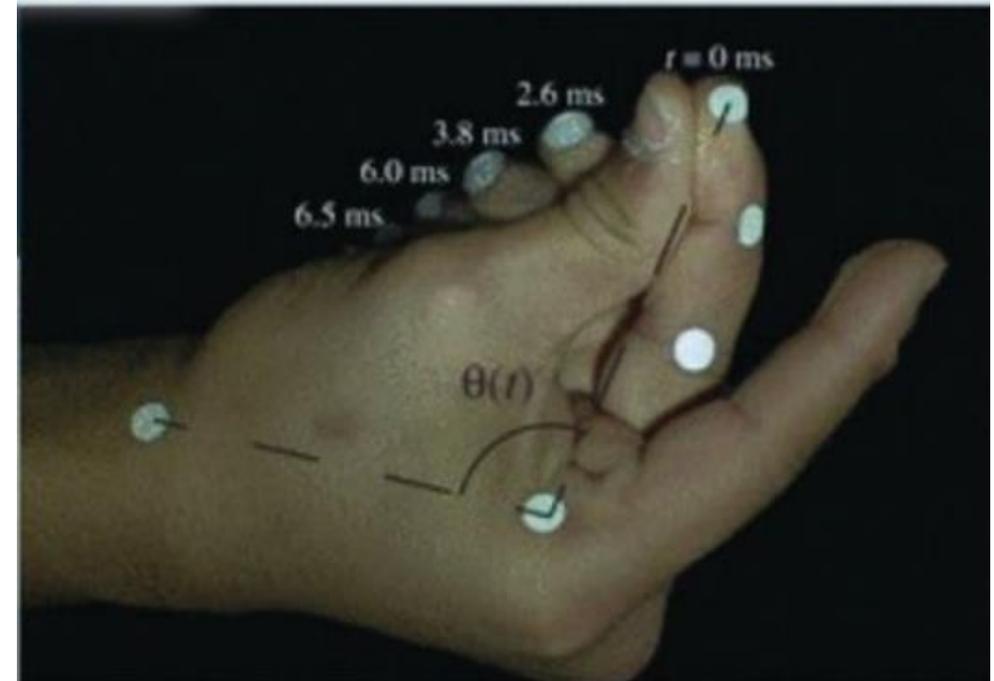
The impact of “Clicking fingers” on society:

- Clicking fingers have always been part of **everyday** human life;
- Appearing over the years in various types of **songs and dances**;
- This ability of man dates back to **ancient times**;
- A **vase** from **ancient** Greece dating back to 320 BCE has recently been discovered;

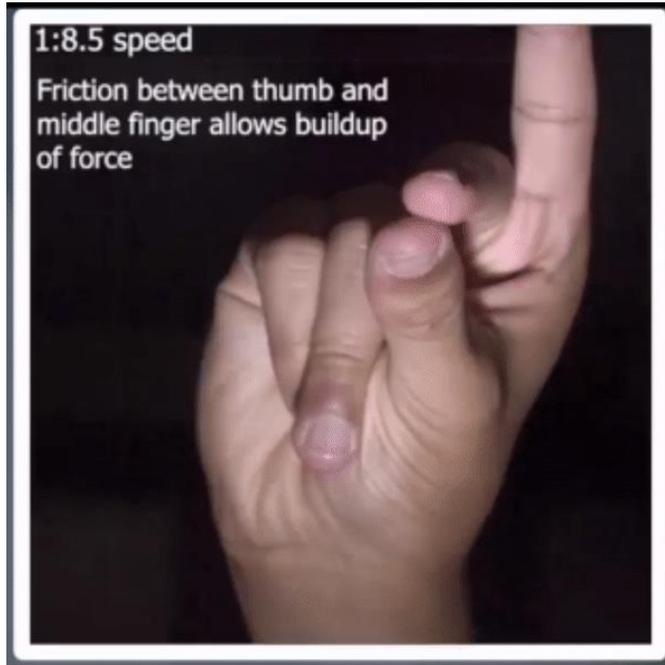


Theory:

- **How does this phenomenon appear:**
 - generated by building **the tension** between the **thumb** and one of the other **fingers**
 - you accumulate **energy** on your **fingertips** when you press your thumb with another finger
 - when the two fingers slide side by side, that energy is released, forming **the sound**

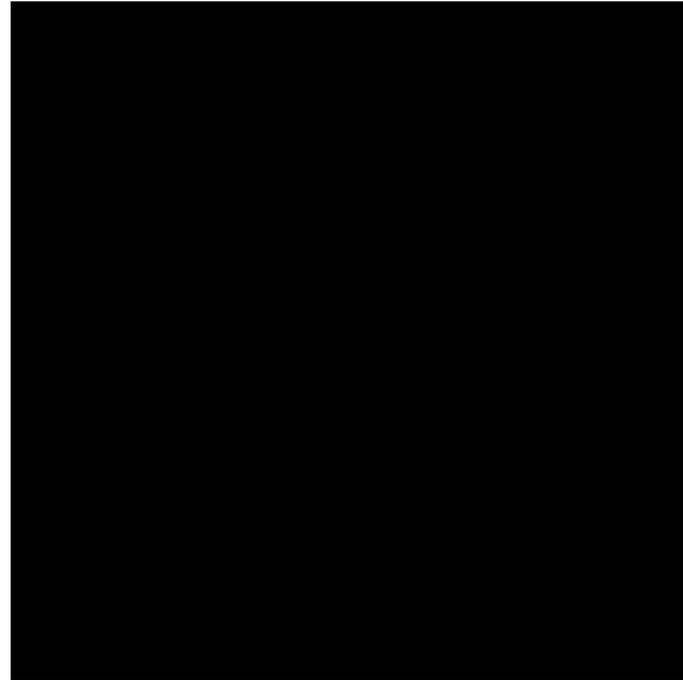


The phases of snapping fingers:



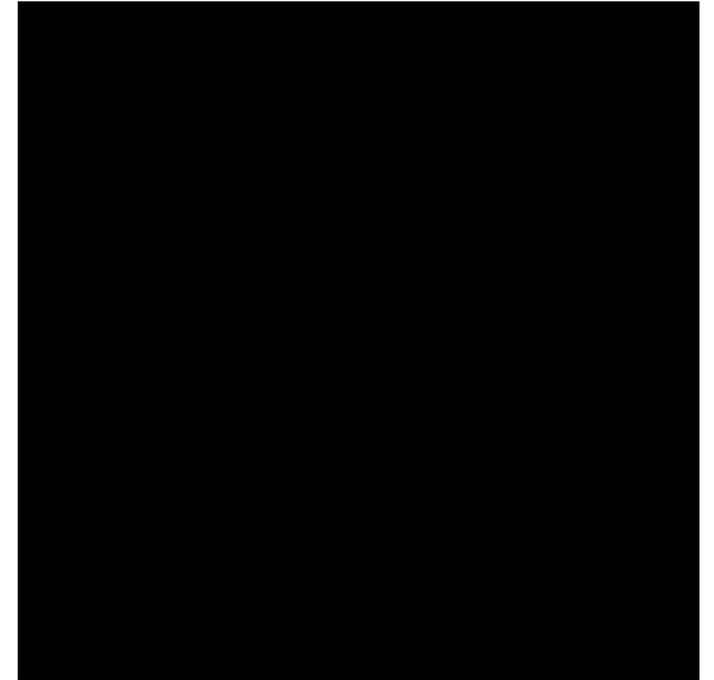
1. Loading

The thumb and middle finger store up **kinetic** energy.



2. Unlatching

Fingers start to **slide** past one another.



3. Unlatching movement

Fingers move at **ultrafast** speeds until the middle finger hits the palm creating shock waves that make the snap sound.

Theory:

- What's the data we obtained after studying the process:
 - one of the fastest recorded **angular accelerations** the human body can produce (7 msec)
 - biophysicist **Saad Bhamla** found out that the process is about 20 times faster than the **blink of an eye** (more than 150 msec)
 - after sliding off the thumb, the middle finger rotates at a speed of up to 7.8 degrees per millisecond (what a professional baseball pitcher's arm can achieve)



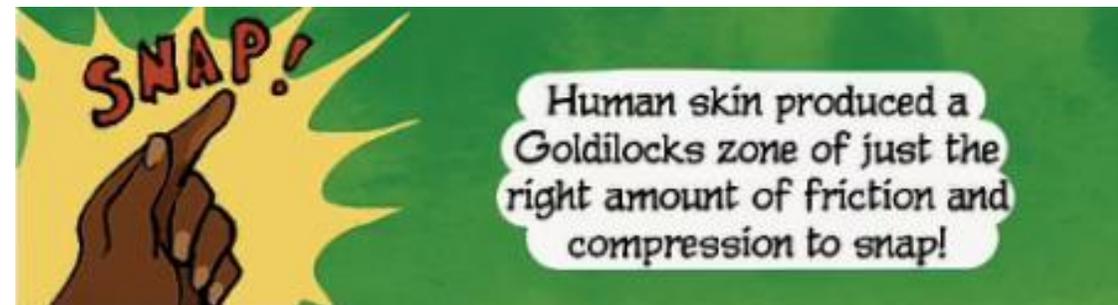
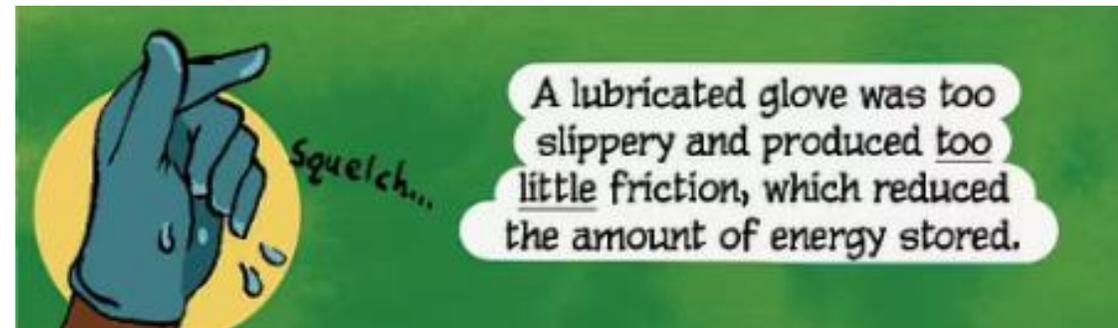
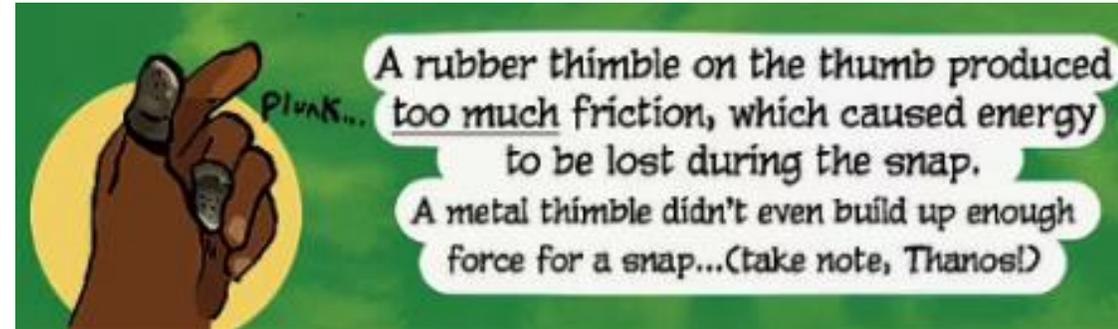
Experiment:

- **watch** different people **snapping their finger**
- snap fingers **in different fluids and pressure situations** (water, oil, low pressure etc.)
- **environmental investigation** (role of wind, temperature, filming in a cave)
- create **statistics** with the **dates** you obtained



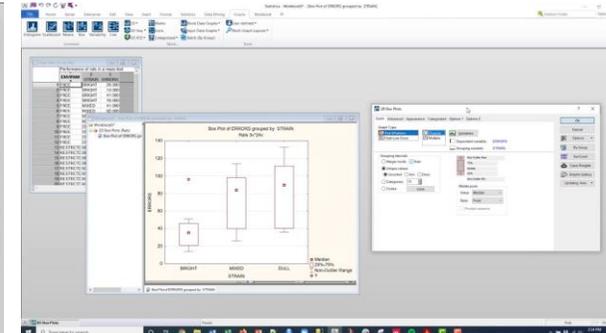
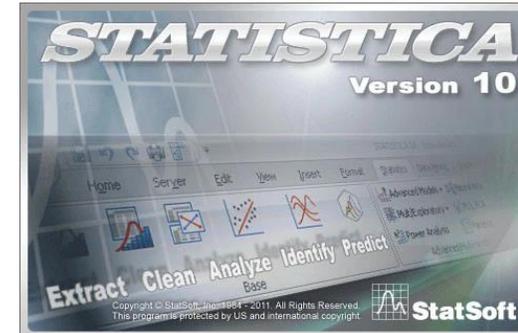
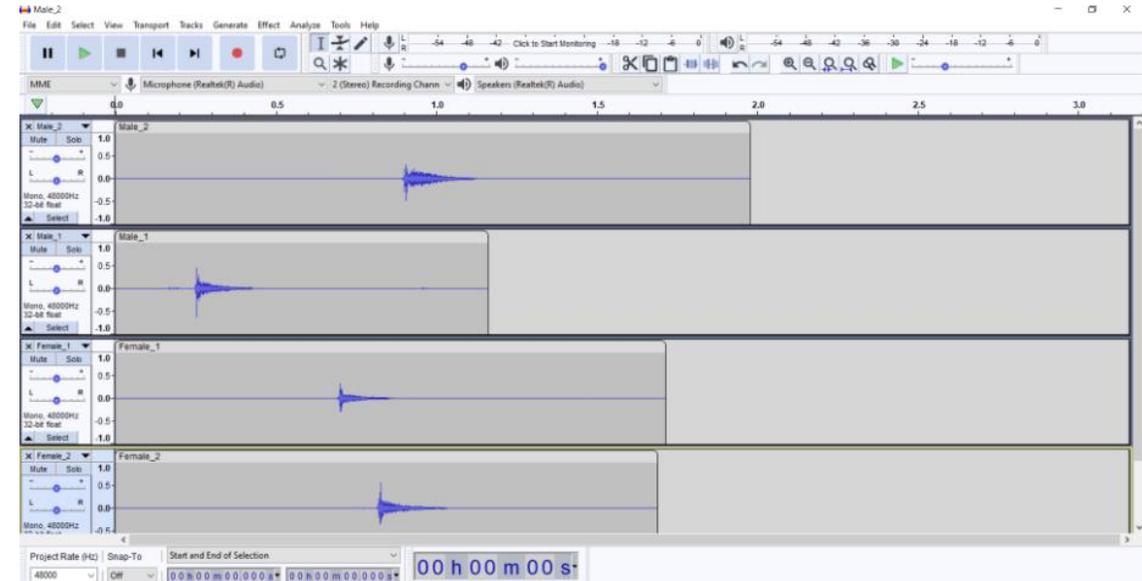
What I want to see:

- If the **intensity of the sound** differs from **person to person** (age, gender);
- If the **dominant hand** produces a **more intense sound**;
- If wearing a **glove** will make **the process difficult**;
- If the **environment** affects **the phenomenon**;
- Which finger produces the **loudest** sound with the thumb;



Materials and methods:

- collect as much **data** as possible, this involves filming people who perform Clicking Fingers in different **environments** and with different **materials**
- an important aspect is that our mobiles have **two microphones** and we have to convert the recordings we made from stereo to **mono**
- next we will insert the new recordings into an application called **Audacity** that will give us the exact number of decibels and the **intensity of the sound**
- with the data obtained, we will create some **graphs** that will provide us with answers to all the questions we wrote down



Research questions:



Question 1: How does the gloves material influence the loudness and if the subjects gender could affect this influence?

Hypothesis 1a: Gloves material influences significantly the loudness produced by clicking of fingers.

Hypothesis 1b: The females generate a different loudness of clicking fingers compared by males among various gloves materials.

Question 2: How do water and flour influence the loudness of clicking and if the subjects gender could affect this influence?

Hypothesis 2a: Water and flour influences significantly the loudness produced by clicking fingers.

Hypothesis 2b: The females generate a different loudness of clicking fingers compared by males among wet hand and hand with flour.

Question 3: Does the dominant hand influence the loudness of clicking and if the subjects gender could affect this influence?

Hypothesis 3a: The dominant hand influences significantly the loudness produced by clicking fingers.

Hypothesis 3b: The females generate a different loudness of clicking fingers compared by males related to dominant hand.

Question 4: Does the dominant finger influence the loudness of clicking and if the subjects gender could affect this influence?

Hypothesis 4a: The dominant finger influences significantly the loudness produced by clicking fingers.

Hypothesis 4b: The females generate a different loudness of clicking fingers compared by males related to dominant finger.

Question 5: How does cave environment influence the loudness of clicking?

Hypothesis 5: The cave environment (echo) influences significantly the loudness produced by clicking fingers.

Experiment rubber, nitrile and lubricated nitrile(video):



Male 1
(Rubber)



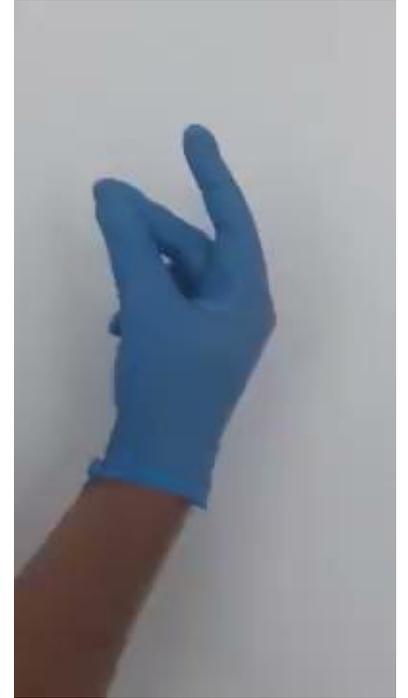
Male 2
(Rubber)



Male 3
(Lubricated Nitrile)



Male 4
(Nitrile)

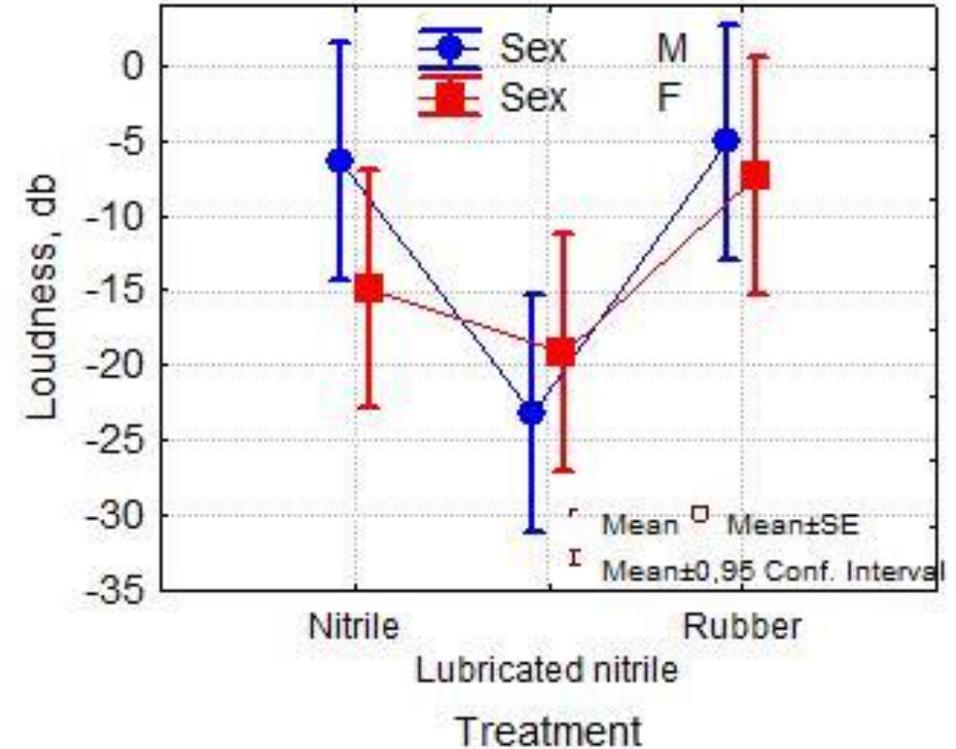
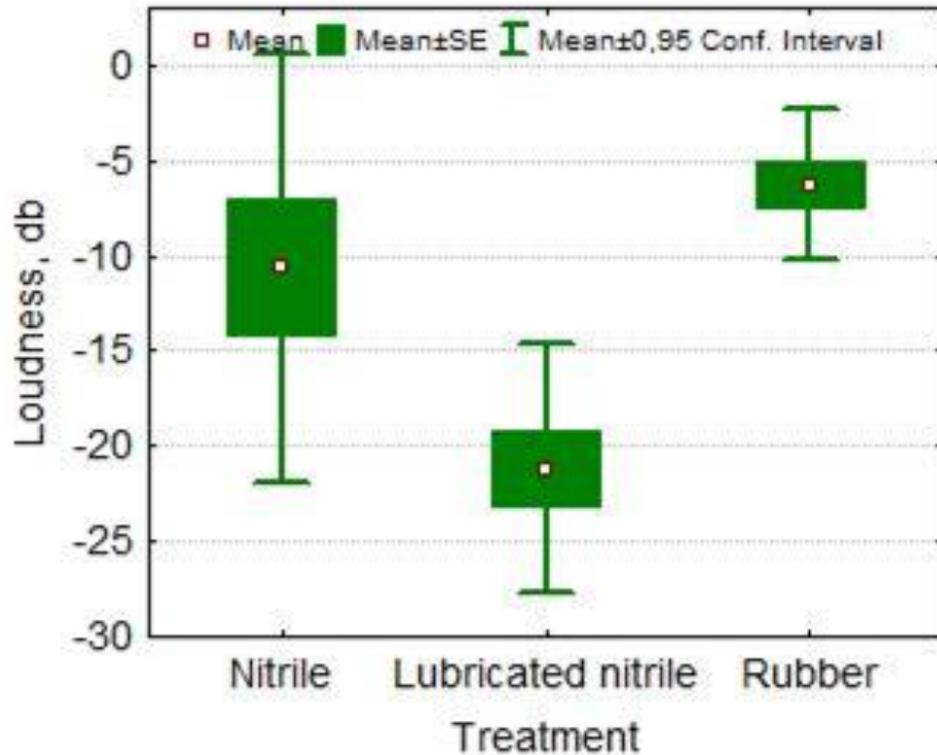


Male 5
(Nitrile)

Question 1: How does the gloves material influence the loudness and if the subjects gender could affect this influence?

Hypothesis 1a: Gloves material influences significantly the loudness produced by clicking fingers

Hypothesis 1b: The females generate a different loudness of clicking fingers compared by males among various gloves materials



✗ No significant differences in loudness between nitrile and lubricated nitrile;

✗ No significant differences between nitrile and rubber;
 ✓ significant differences between lubricated nitrile and rubber;

(significant higher loudness produced by rubber gloves compared to that produced by lubricated nitrile gloves) → H1a accepted.

✗ No significant differences between female and male subjects among various gloves materials

→ H1b rejected

Experiment with flour and water(video):



Male 1
(Flour)



Male 2
(Flour)



Male 3
(Simple hand)



Female 1
(Water)

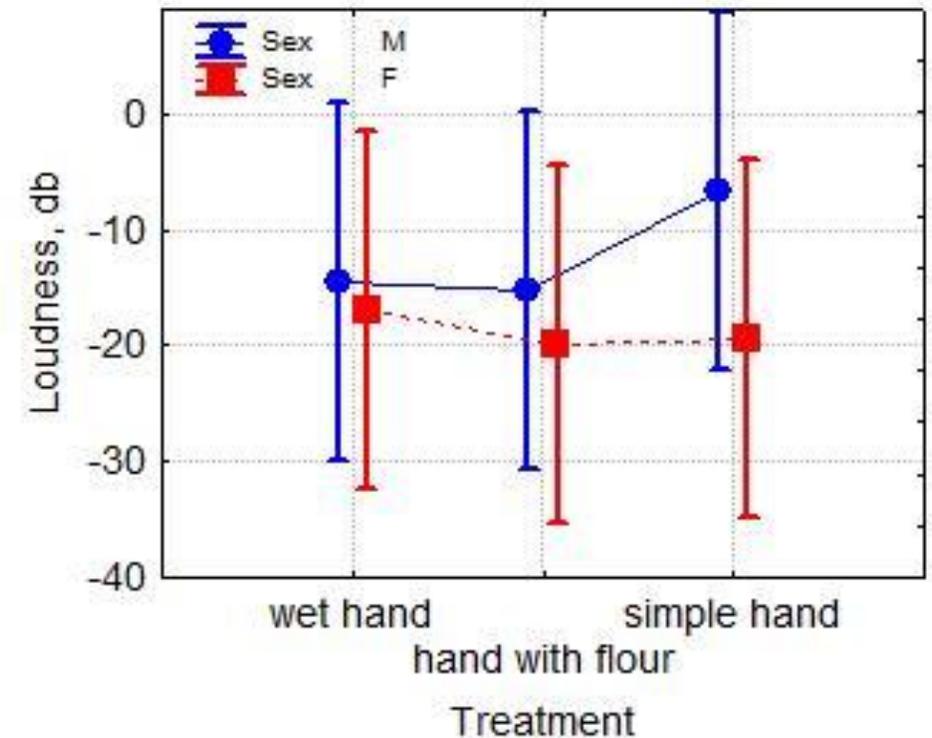
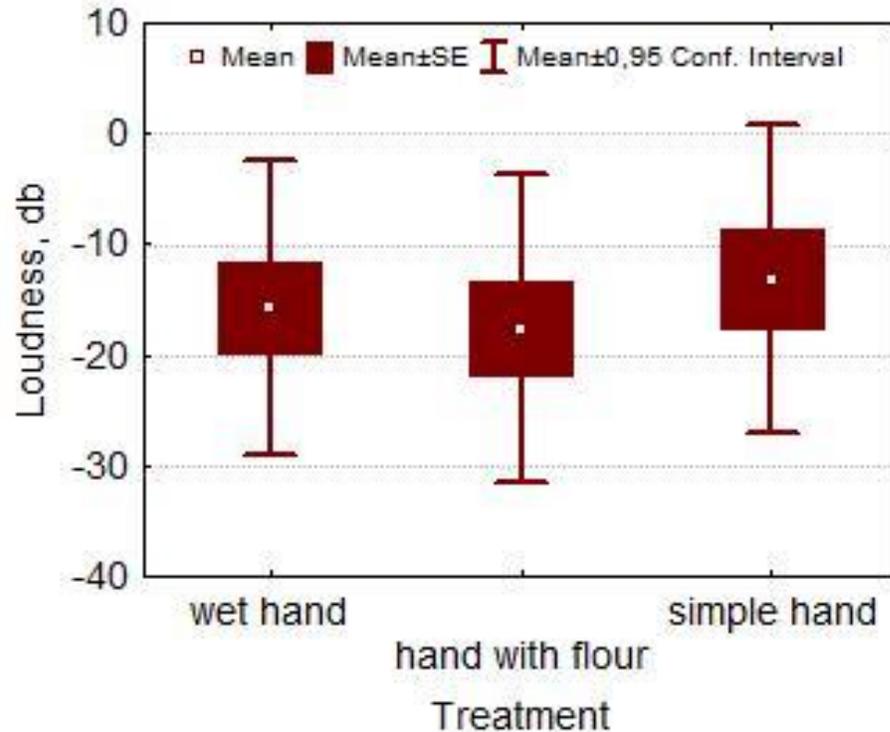


Male 4
(Water)

Question 2: How do water and flour influence the loudness of clicking and if the subjects gender could affect this influence?

Hypothesis 2a: Water and flour influences significantly the loudness produced by clicking fingers.

Hypothesis 2b: The females generate a different loudness of clicking fingers compared by males among wet hand and hand with flour.



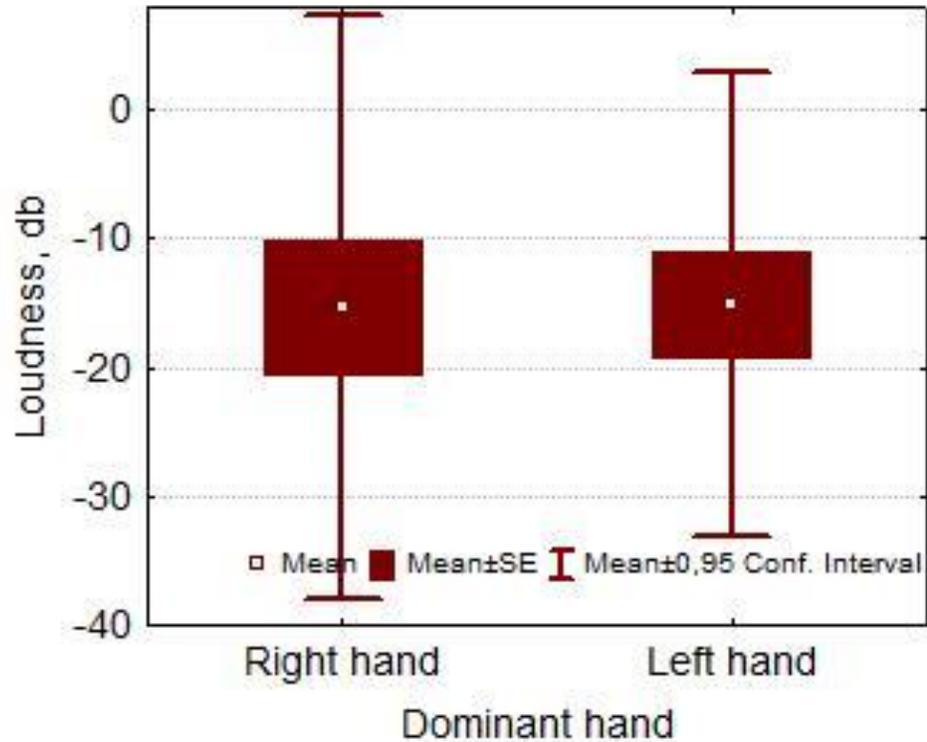
✗ No significant differences in loudness were produced by wet hand and hand with flour compared with simple hand;
➡ H2a rejected.

✗ No significant differences between female and male subjects among wet hand and hand with flour ➡ H2b rejected

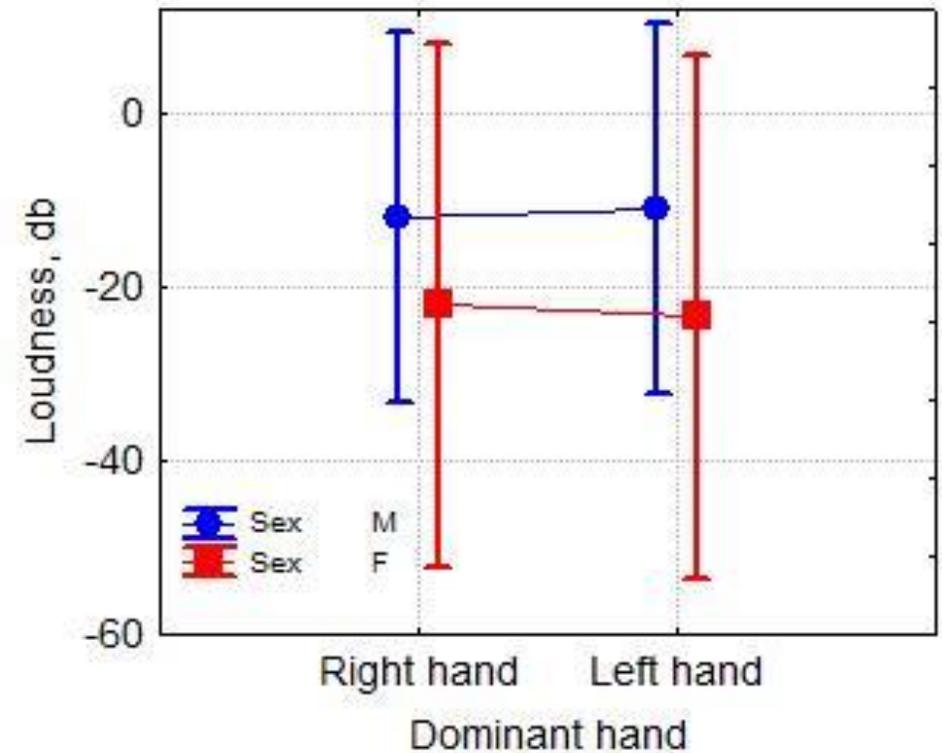
Question 3: Does the dominant hand influence the loudness of clicking and if the subjects gender could affect this influence?

Hypothesis 3a: The dominant hand influences significantly the loudness produced by clicking fingers.

Hypothesis 3b: The females generate a different loudness of clicking fingers compared by males related to dominant hand.



✗ No significant differences in loudness were recorded by using either right hand or left hand;
➡ H3a rejected.

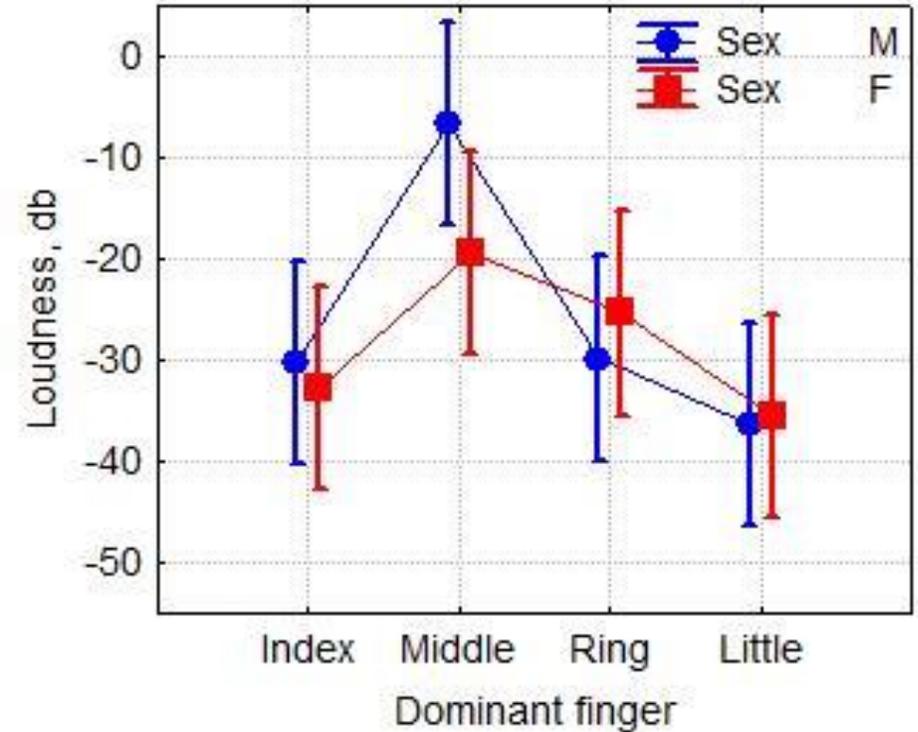
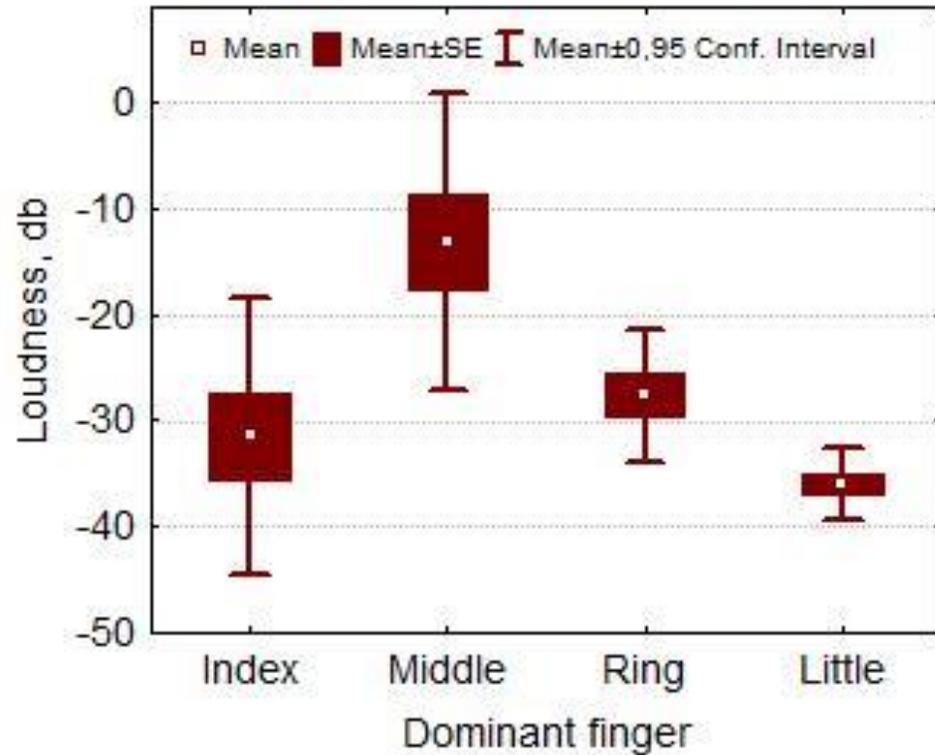


✗ No significant differences between female and male subjects within using of right or left hand;
➡ H3b rejected

Question 4: Does the dominant finger influence the loudness of clicking and if the subjects gender could affect this influence?

Hypothesis 4a: The dominant finger influences significantly the loudness produced by clicking fingers.

Hypothesis 4b: The females generate a different loudness of clicking fingers compared by males related to dominant finger.



✔ Significant differences in loudness were detected by using middle compared to little finger; → H4a accepted.

✘ No significant differences between female and male subjects among various dominant fingers; → H4b rejected

Experiment cave(video):



Male 1
(Cave)



Male 2
(Cave)



Male 3
(Cave)



Male 4
(Cave)



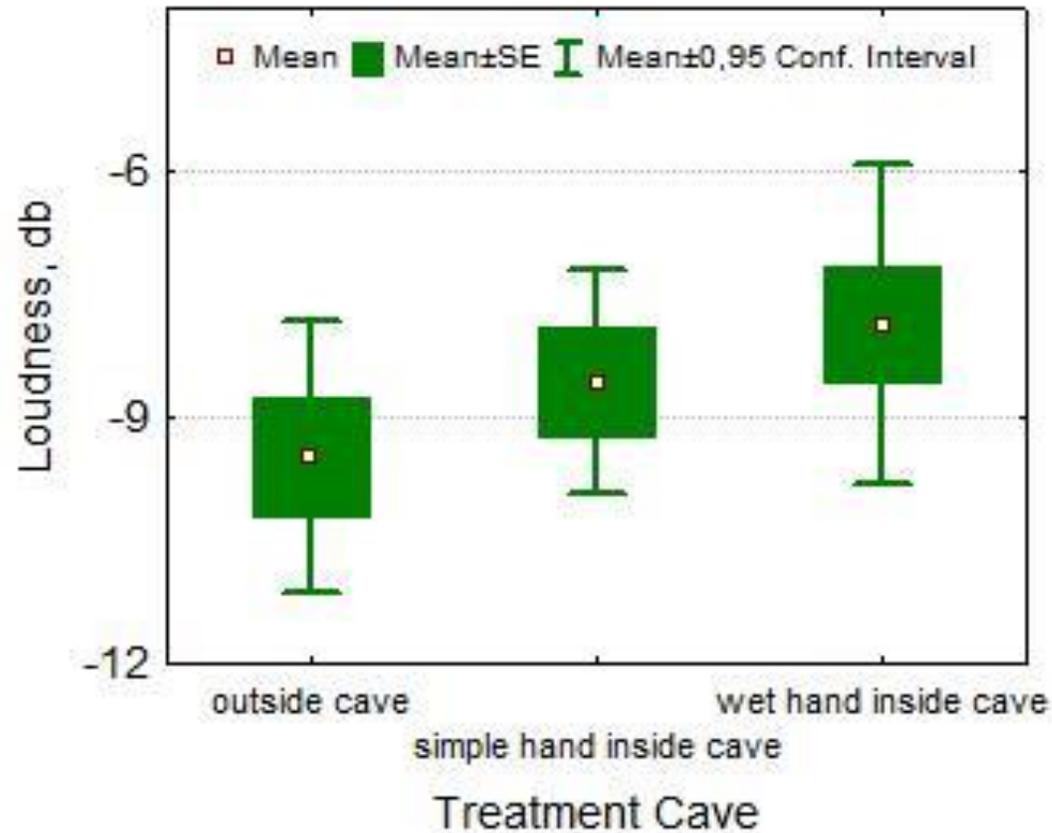
Male 5
(Water)



Male 6
(Water)

Question 5: How does cave environment influence the loudness of clicking?

Hypothesis 5: The cave environment (echo) influences significantly the loudness produced by clicking fingers.



- ✗ No significant differences in loudness were detected outside cave compared to the two inside cave variants (simple hand and wet hand);
 - ✗ No significant differences were recorded between wet hand and simple hand inside cave;
- ➡ H5 rejected.

Conclusions:



- ✓ ● **Gloves material** influenced significantly the loudness produced by clicking fingers.
- ✗ ● Using of **wet** hand and hand with **flour** did not produce significant differences in loudness compared with **simple** hand.
- ✗ ● No significant differences in loudness were recorded by using either **right** hand or **left** hand.
- ✓ ● Significant differences in loudness were detected by using the **middle** compared to the **little** finger.
- ✗ ● The **cave environment** did not play any significant role on the loudness produced by clicking fingers (outside vs inside cave).
- ✗ ● The **loudness** of the sound was not influenced by the **gender** of the subjects in any of the cases of this experiment.

Biography:

- <https://royalsocietypublishing.org/doi/10.1098/rsif.2021.0672>
- <https://www.science.org/content/article/perfect-amount-friction-gives-finger-snaps-their-signature-pop>
- <https://www.futurity.org/finger-snap-physics-friction-2658992-2/>
- <https://cosmosmagazine.com/science/physics/how-do-fingers-snap-physics-snapping/>
- <https://www.sciencenews.org/article/finger-snap-physics-new-high-speed-video-thanos>



This is the end of my project!

**Thank you
for your attention!**

