

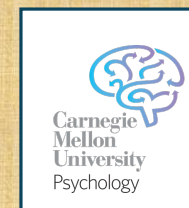
Accompanying misophonic sounds with Movies, Words, and Images

Conversations About Research for Everyone with Misophonia, CARE Day 2025

Professor Laurie M. Heller

Carnegie Mellon University

www.auditorylab.org



FINAL 1

Auditory Lab at CMU



Carnegie Mellon University in Pittsburgh, PA, USA

20 yrs studying Environmental Sounds:
Their identification, localization, effects



Heller LM, Oszczapinska U, Smith JM, Julien MM (2025)

Reassigning sources of misophonic trigger sounds to change their unpleasantness: Testing alternative mechanisms with a new set of movies, paintings, and words

PLOS ONE 20(4): e0321594. <https://doi.org/10.1371/journal.pone.0321594>

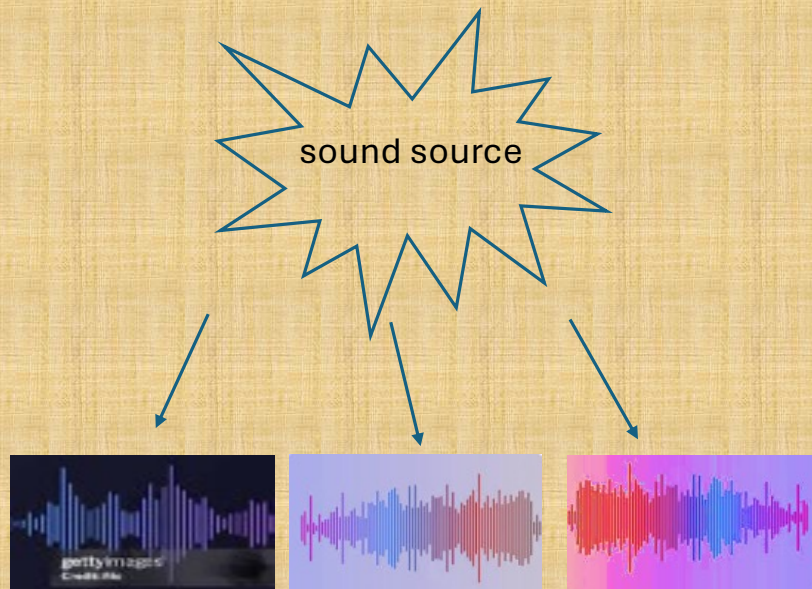
Key idea

Cause of misophonic sounds tend to be certain people, certain actions (especially if repeated) – no matter how loud

- **We can alter the emotional response to sounds through images, videos, or words**
- Make a video or description that implies a more neutral cause for an unpleasant sound
 - Quantify impact on unpleasant sounds for both misophonic and nonmisophonic samples
 - Address alternative explanations and options (in other experiments)

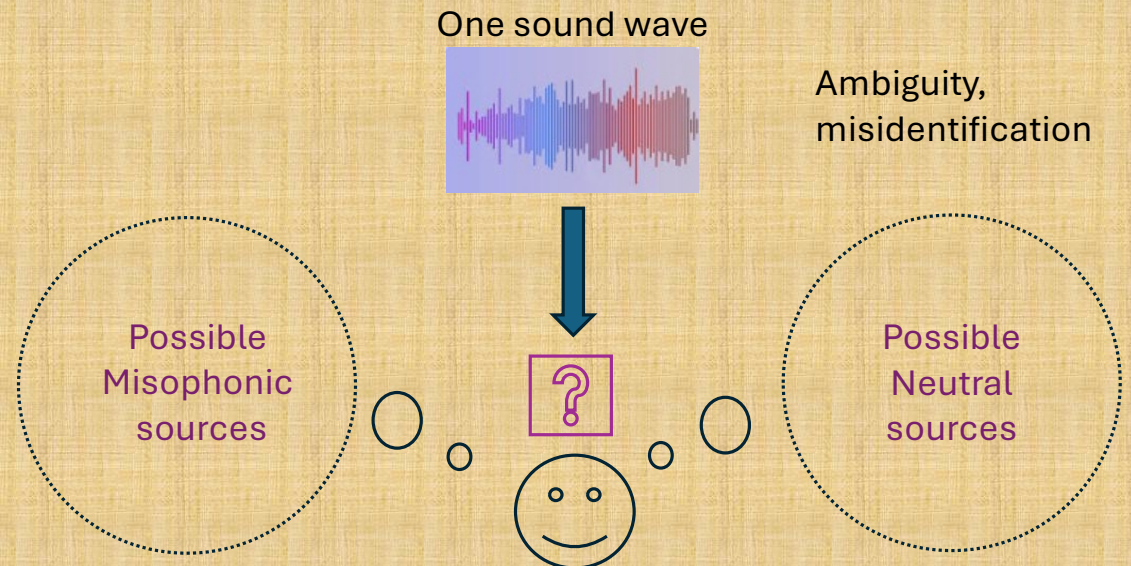
Sound waves don't specify an exact source

One source (object) can make many different sound waves



Many possible sound waves

One sound wave COULD be produced by many different sources



Foley effects – radio and movies



Original purpose: use other objects when its not safe or practical to make the real sound. Mimic sound of horse galloping with coconut halves, etc.

My purpose: 20 yrs studying sound identification

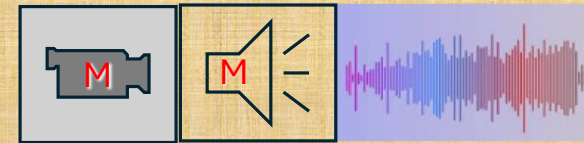
Showing different sound sources with videos

One half:

- Video of object making a sound & hear sound.

Rate the sound:

- Extremely Unpleasant -5 -4 **-3** -2 -1 0 1 2 3 4 5 Extremely Pleasant
- Is the video a plausible cause of the sound? (worst) 1 2 3 4 5 (best)



Other half :

- Neutral, plausible video of different object & hear same sound

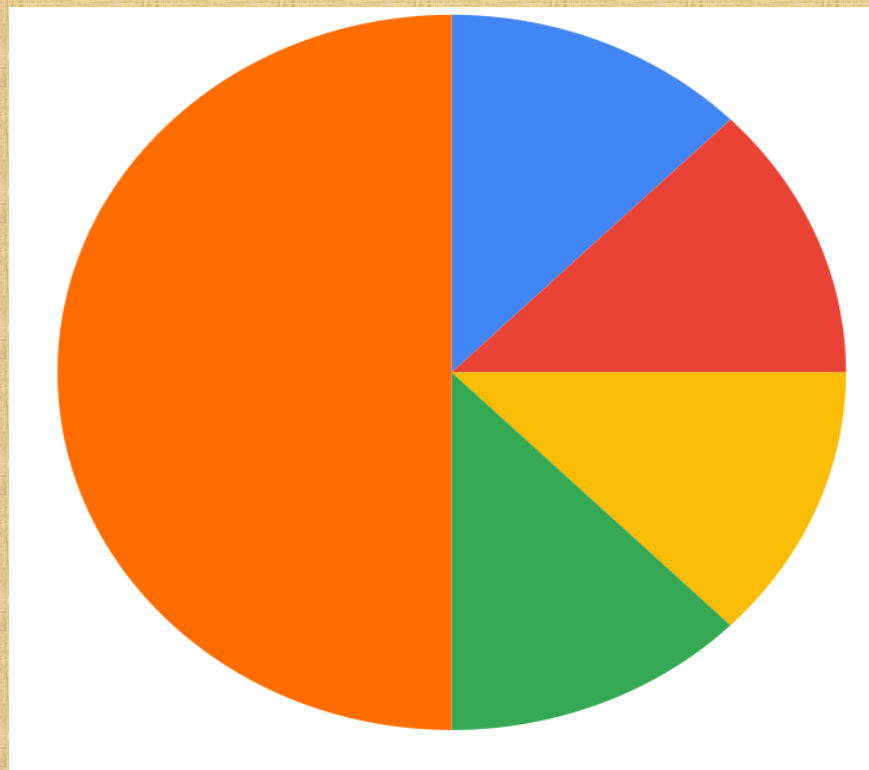
Rate the sound.

- Extremely Unpleasant -5 -4 -3 -2 -1 0 **1** 2 3 4 5 Extremely Pleasant
- Is the video a plausible cause of the sound? (worst) 1 2 3 4 5 (best)



- Pleasantness CHANGE = +4 (in this example)
- PLAUSIBLE relates to CHANGE

Many possible components of the effect of videos: series of studies



● Plausibility of the Neutral Source

Alternative explanations:

- Visual input is a distraction from the sound
- Seeing anything pleasant is helpful
- Perceptual quality match between senses
- Good auditory-visual alignment (better technical work on movie)

* This pie chart is conceptual, not exact data

Would *anything* visually pleasant work?

Study: Pleasant abstract paintings, no objects or scenes

- 1) Listen to unpleasant sounds alone and rate (e.g. -2)
- 2) Listen again while viewing a pleasant painting (e.g. -1)

Change: **+1**



Paintings courtesy of The Art Institute of Chicago online collection

Very small but reliable benefit

Note: Abstract painting must be pleasant to the individual (pre-selected)

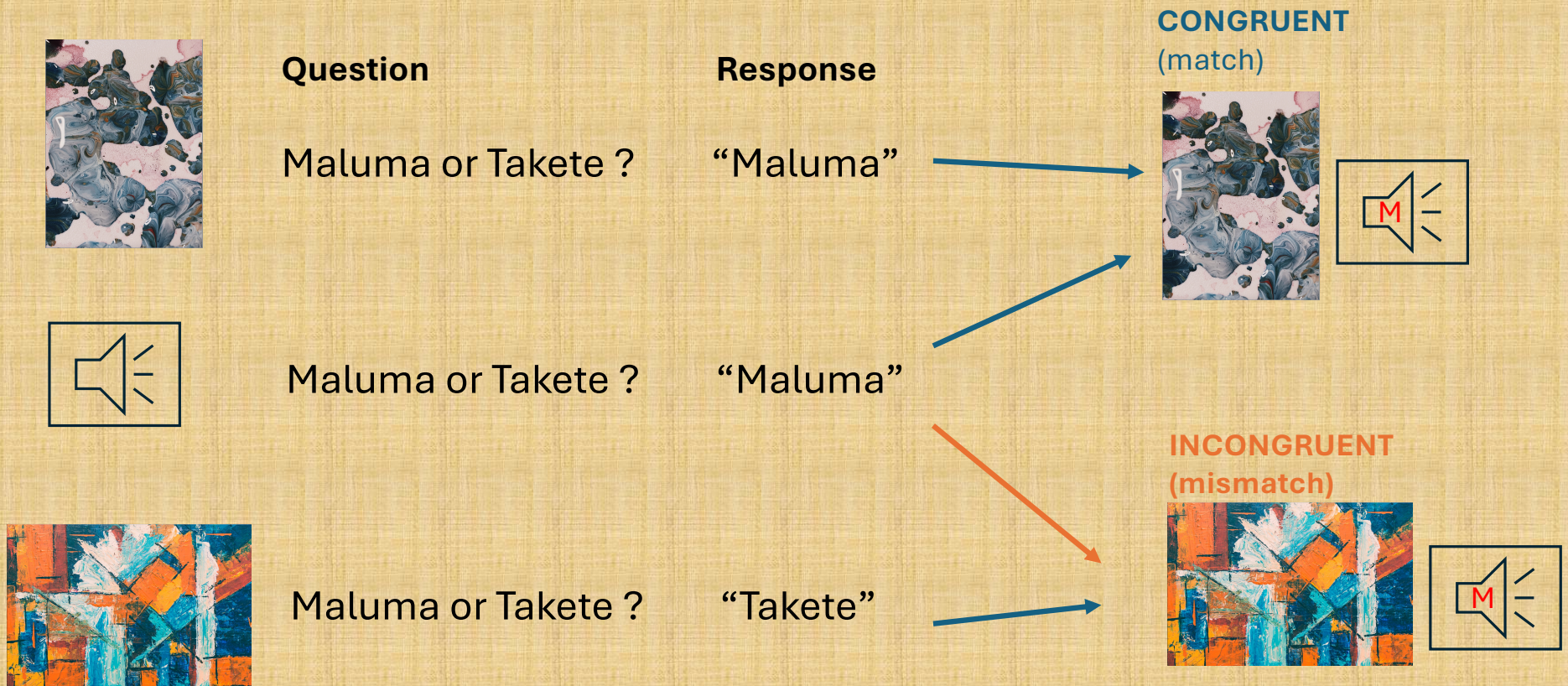
Why?

People also rated the “match” of sound and painting every trial, but that did not predict the Increase in pleasantness.

What explains this effect?



Perceptual matching between image and sound



Judge only one component at a time. Different participants from the main study. Matches used for analysis.

Perceptual match vs. Source plausibility: different mechanisms of change

- Abstract painting and sound:
- A BETTER PERCEPTUAL MATCH (congruence) between a meaningless image and a sound has a bigger effect. Match is about perceptual qualities, not source of sound.

CONGRUENT
(match)



- Neutral video and sound:
- MORE PLAUSIBLE MATCH between neutral video and sound has a bigger effect. Match is about source of sound, not perceptual qualities.



DESCRIPTIONS of sound sources

One half:

- Read description & hear sound.

Rate the sound:

- Extremely Unpleasant -5 -4 -3 **-2** -1 0 1 2 3 4 5 Extremely Pleasant
- How well do audio & description match? (worst) 1 2 3 4 5 (best)

Person doing a
misophonic action



Other half :

- Read neutral, plausible description & hear same sound

Rate the sound:

- Extremely Unpleasant -5 -4 -3 -2 -1 **0** 1 2 3 4 5 Extremely Pleasant
- How well do audio & description match? (worst) 1 2 3 4 5 (best)

Person doing a
neutral action



- CHANGE = +2 (example)

Not as effective as videos,

But source PLAUSIBILITY has same effect on CHANGE as videos

Takeaways

We can decrease sound unpleasantness with neutral sources that are plausible

This is effective for both misophonic and nonmisophonics individuals

Visually depicted sources are most effective, but not far behind are verbal descriptions of sources, which are more flexible to create and use. They share the same root cause.

Meaningless pleasant images that perceptually match the sounds have a much smaller benefit.



Physiological effects

Two other papers on misophonia from my lab in 2025:

When listening to a range of positive and negative emotional sounds, **misophonic listeners had greater pupil dilation to trigger sounds** and highly disgusting sounds compared to nonmisophonic listeners.

We found **pupil constriction toward movies with visual & audio depictions of trigger sounds** that evoked feelings of disgust, despite the fact that most other emotional sounds and images create pupil dilation.

Psychophysiology,
2025



*Frontiers in Auditory
Cognitive Neuroscience,*
2025



Acknowledgements

Funding & Support

- Misophonia Research Fund
- Carnegie Mellon University SURF Grant
- Acoustical Society of America's SURIEA Program
- soQuiet.org

Student Collaborators

- Urszula Oszczapinska, Megan Julien, Jessica Smith

PLOS One, 2025

