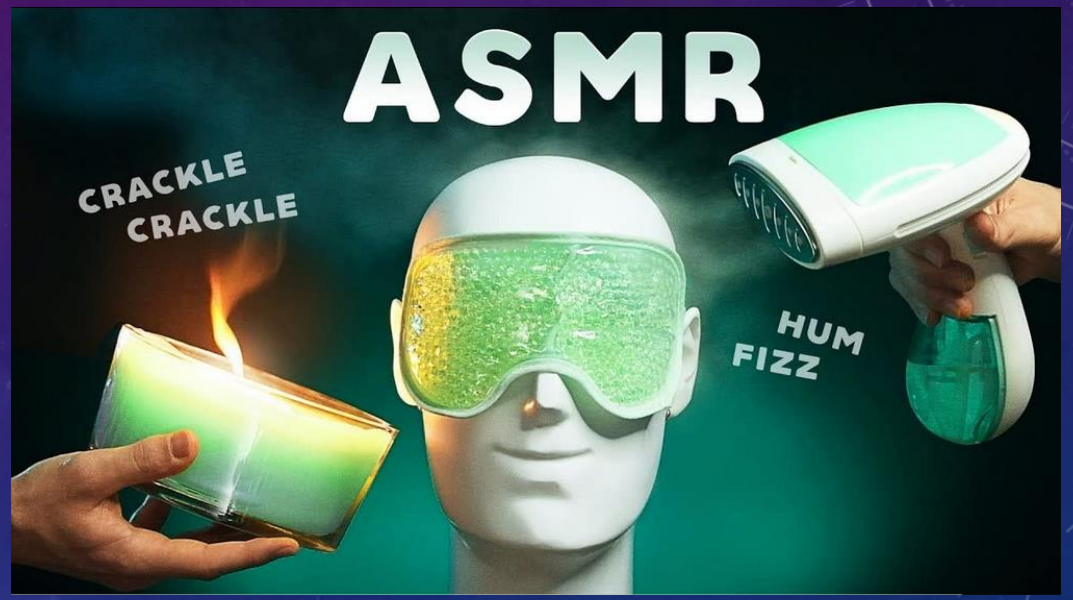
THE SCIENCE OF ASMR

PHYS 536

BY ADRIENNE BATH

WHAT IS ASMR?

- Autonomous Sensory Meridian Response
- Chills or “tingles” caused by audiovisual stimuli
- Originate at the back of the head and move down the spine and to extremities
- Only a subset of the population are “ASMR Responders”
- Used for relaxation and as a sleep aid



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AUDIOVISUAL ASPECTS

- Many videos on YouTube
- Frequently attractive female “ASMRtist”
- Dim lighting or clinical setting
- “Triggers” can be audio or visual
  - Audio
    - Soft-spoken/whispers
    - Crisp sounds
  - Visual
    - Slow Movements
    - Methodical/expert completion of basic tasks
    - Personal attention

https://www.youtube.com/watch?v=TmIzOnq2R1M

SCIENCE OR PSEUDO-SCIENCE?

[ASMR] Detailed Cranial Nerve Exam

1.7M views • 1 year ago

Tingting ASMR

Doctor **Tingting** is back to give you a detailed cranial nerve **exam** in this relaxing personal attention focused **ASMR**. Enjoy a soft ...

https://www.youtube.com/results?search_query=ting+ting+asmr+exam

- Relatively new phenomenon
  - Started gaining popularity in the 2010's
- Many psychological studies
- Few physics-based studies
- Most studies based on self-reported ASMR feelings

PSYCHOLOGICAL STUDIES

- Self-reported questionnaires
- Functional Magnetic Resonance Imaging
- Focus on emotional response
- Focus on personality traits that might make someone more or less susceptible to AMSR response
  - Openness
  - Neuroticism
- Relation to misphonia

DIFFERENT FROM FRISSON?

Frisson

- Music-induced “chills”/goosebumps
- Short duration
- Located on head, neck, and back
- Caused by loud sounds, many sources of sound at once, low pitch, approaching sounds, infrasound, scream-like sounds, and surprise

ASMR

- “Tingles”
- Can be sustained, though more subdued
- Located on head, neck, and back
- Caused by soft sounds, one/few sound sources, low pitch, comfortable sounds

ACOUSTIC CHARACTERISTICS

Sound Quality Factors Inducing Autonomous Sensory Meridian Response by Shimokura

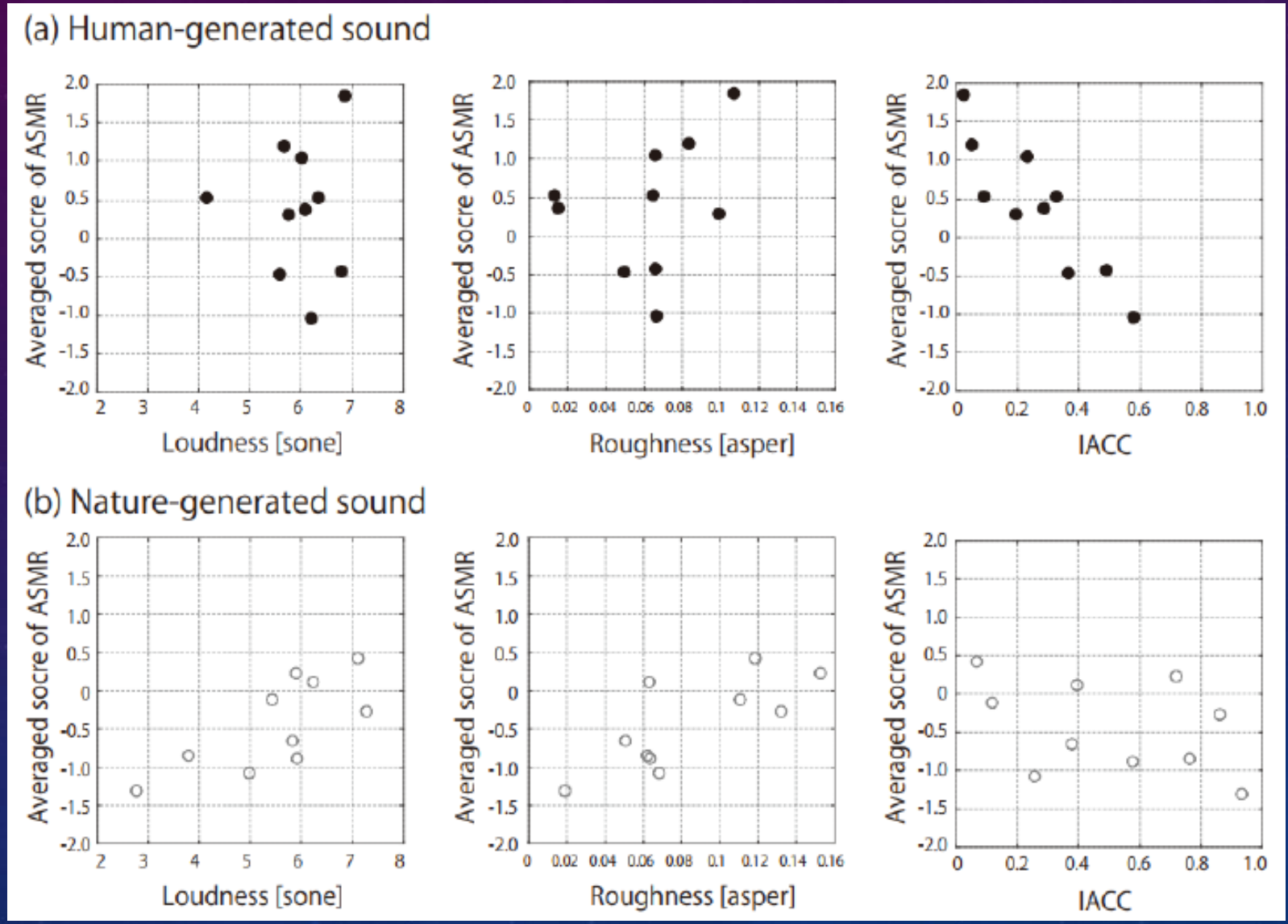
- Zwicker's Parameters
  - Loudness
  - Sharpness
  - Roughness
  - Fluctuation Strength
- Autocorrelation and Interaural Cross-Correlation Functions (ACF and IACF)
  - Fundamental Frequency (τ_1)
  - Pitch Strength (ϕ_1)
  - Spectral Centroid of the original signal ($W_{\phi(0)}$)
  - Interaural Cross-Correlation Coefficient (IACC)

Table 1. Human- and nature-generated sounds and calculated Zwicker's and ACF/IACF parameters.

Sound Source			Zwicker's Parameters				ACF/IACF Parameters			
	Short Title	Contents	Loudness [sone]	Sharpness [acum]	Roughness [asper]	Fluctuation Strength [vacil]	τ_1 [ms]	ϕ_1	$W_{\Phi(0)}$ [ms]	IACC
Human-generated sound	Cutting	Cutting vegetable	6.20	1.63	0.07	1.31	2.52	0.20	0.26	0.58
	Fizzwater	Stirring carbonated water	4.15	3.25	0.06	0.02	0.22	0.29	0.06	0.09
	Typing	Typing a keyboard	5.75	2.22	0.10	0.59	0.86	0.15	0.09	0.19
	Heels	Footsteps of high heels	5.58	1.58	0.05	0.43	1.56	0.19	0.36	0.37
	Book	Flipping a book	6.01	1.94	0.07	0.06	1.40	0.13	0.13	0.23
	Brush	Brushing something	6.79	1.78	0.07	0.05	1.99	0.15	0.14	0.49
	Shampoo	Washing hair with shampoo	5.67	2.33	0.08	0.33	1.92	0.04	0.10	0.05
	Hair	Cutting hair	6.34	2.17	0.01	0.39	0.93	0.42	0.09	0.33
	Pen	Writing with pen	6.08	2.54	0.01	0.39	0.42	0.29	0.06	0.29
	Earpick	Earpick	6.86	1.30	0.11	0.74	6.45	0.05	0.40	0.02
Nature-generated sound	Fire	Building a fire	7.28	1.88	0.13	0.03	3.32	0.11	0.12	0.86
	Bubble	Bubbles under water	6.23	0.70	0.06	0.07	6.74	0.21	0.77	0.40
	Brook	Murmur of a brook	5.43	1.87	0.11	0.07	1.70	0.13	0.15	0.12
	Waves	Sound of waves	5.83	1.43	0.05	0.06	3.63	0.05	0.30	0.38
	Rain	Sound of rain	5.92	2.11	0.06	0.10	3.63	0.05	0.30	0.58
	Lava	Lava flowing	5.90	2.53	0.15	0.02	0.68	0.09	0.07	0.72
	Cricket	Bell-ringing cricket	3.78	3.19	0.06	0.02	0.48	0.84	0.07	0.76
	Cicada	Evening cicada	2.77	2.69	0.02	0.02	0.28	0.95	0.09	0.93
	Volcano	Bubbles of mud volcano	7.11	1.46	0.12	0.29	1.65	0.15	0.22	0.07
	Bamboo	Wind through bamboo forest	4.98	3.13	0.07	0.06	3.76	0.02	0.06	0.26

(Shimokura, 2022)

ACOUSTIC CHARACTERISTICS (CONT.)

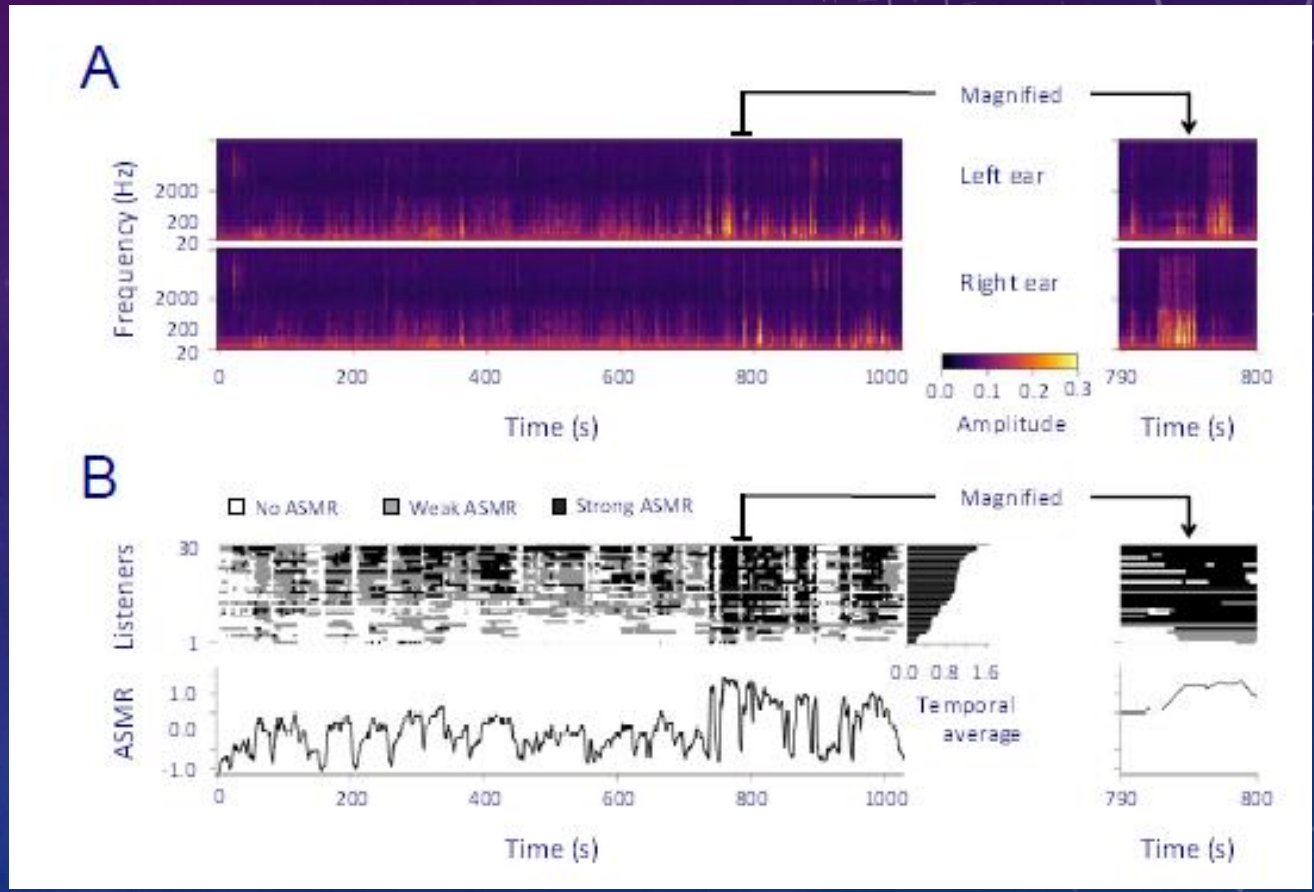


(Shimokura, 2022)

ACOUSTIC CHARACTERISTICS (CONT.)

Deep, soft, and dark sounds induce autonomous sensory meridian response by Komura et al

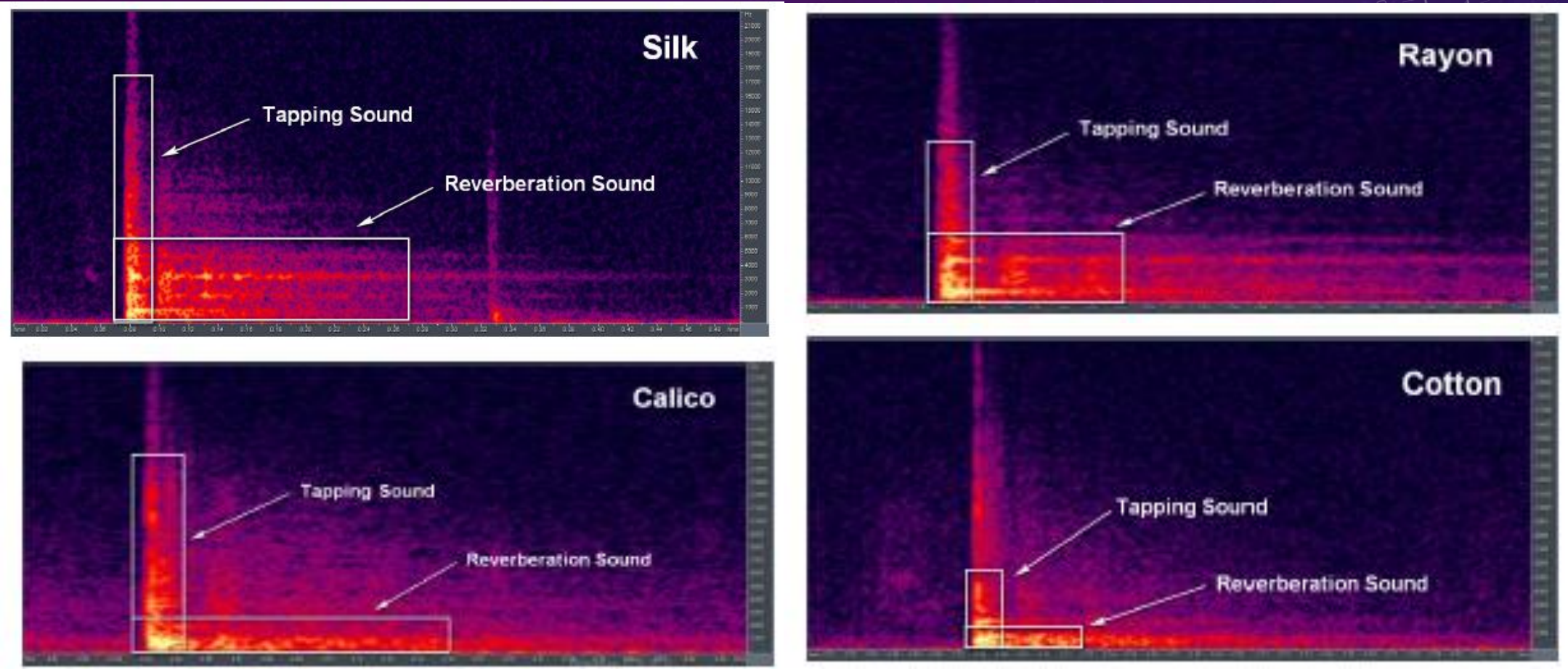
- Amplitude
- Spectral Centroid
- Spectral Bandwidth
- Low-pitch
- “Dark” timbre
- Max ASMR ~2 seconds after change in acoustic features



(Komura et al, 2020)

STUDIES OF SPECIFIC SOUNDS

Korean Dadmi



(Ahn, et al, 2018)

STUDIES OF SPECIFIC SOUNDS

Stepping on Snow

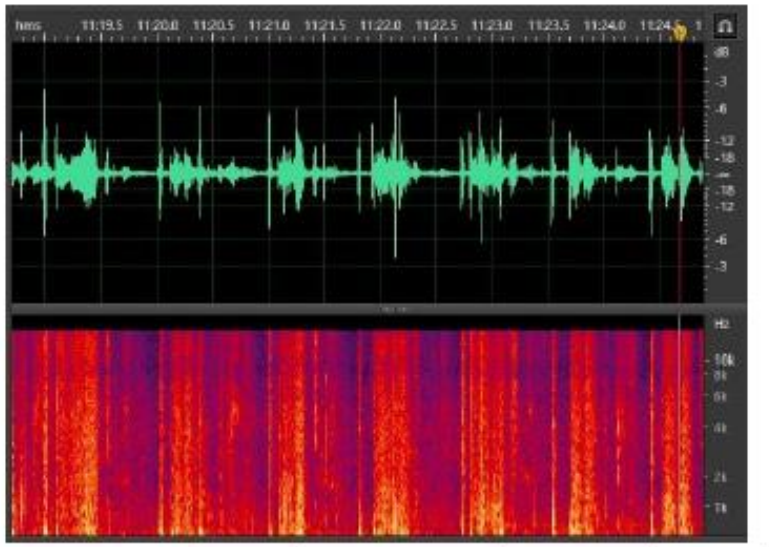
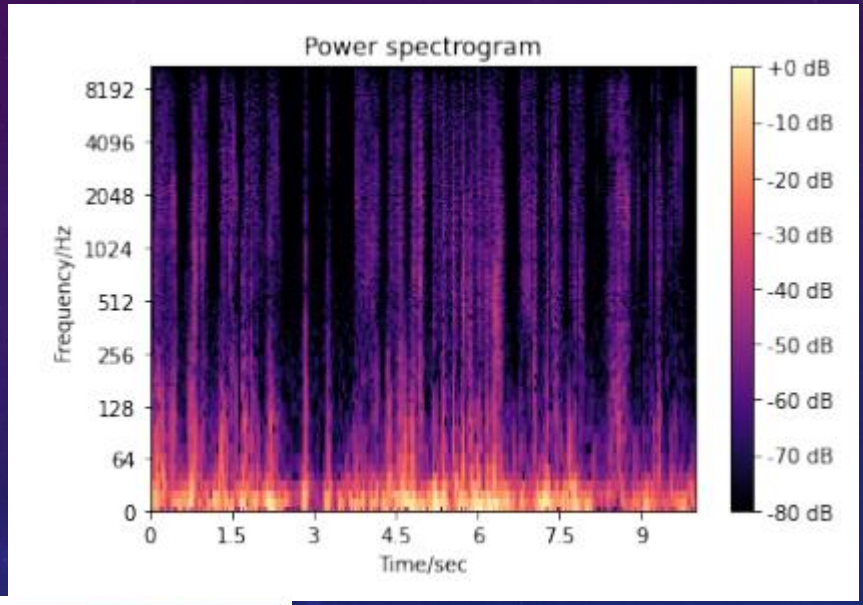


Figure 1. Waveform and spectrogram of snow stepping sound

(Tian et al, 2020)

Puffing Spray

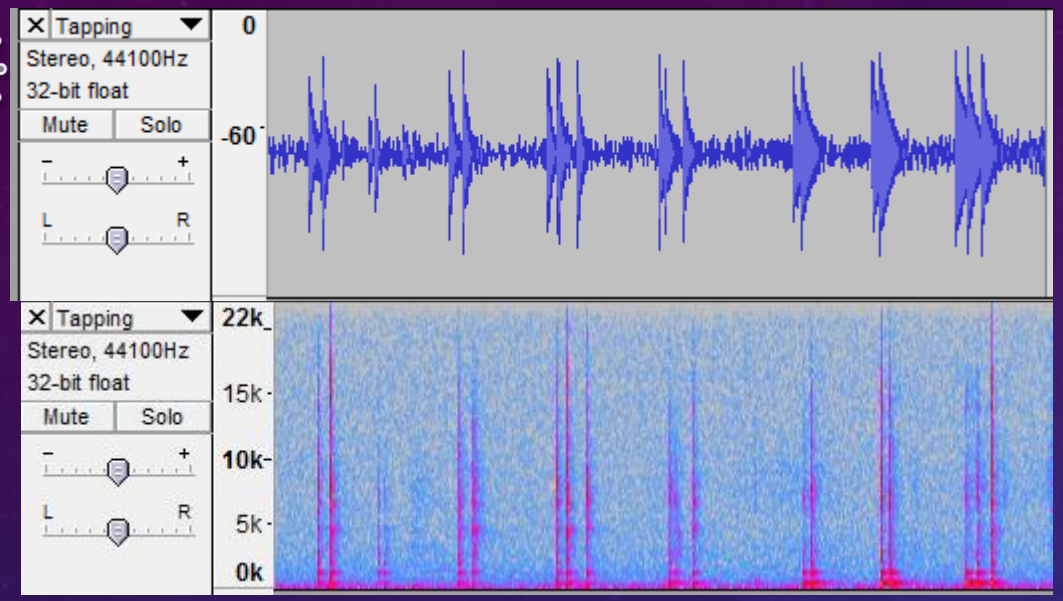


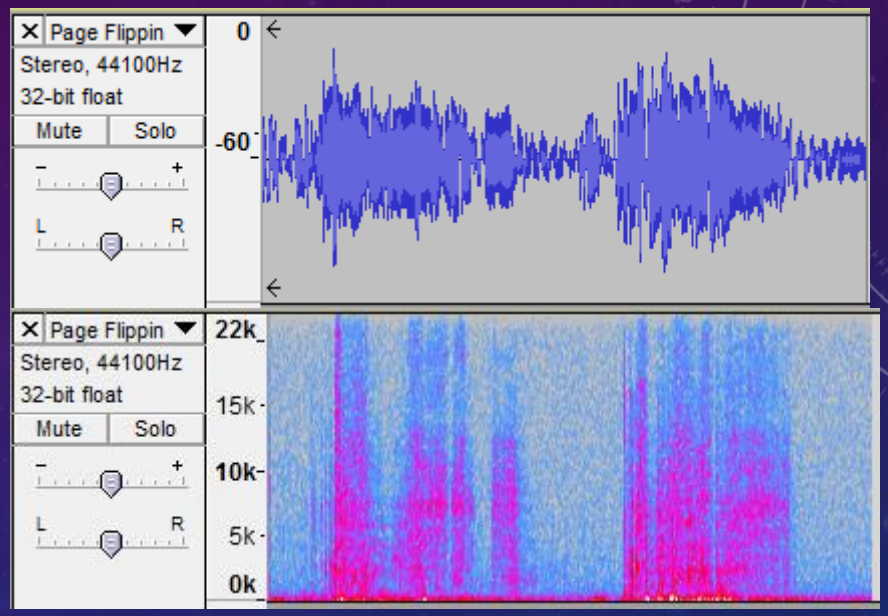
(Fang et al, 2022)

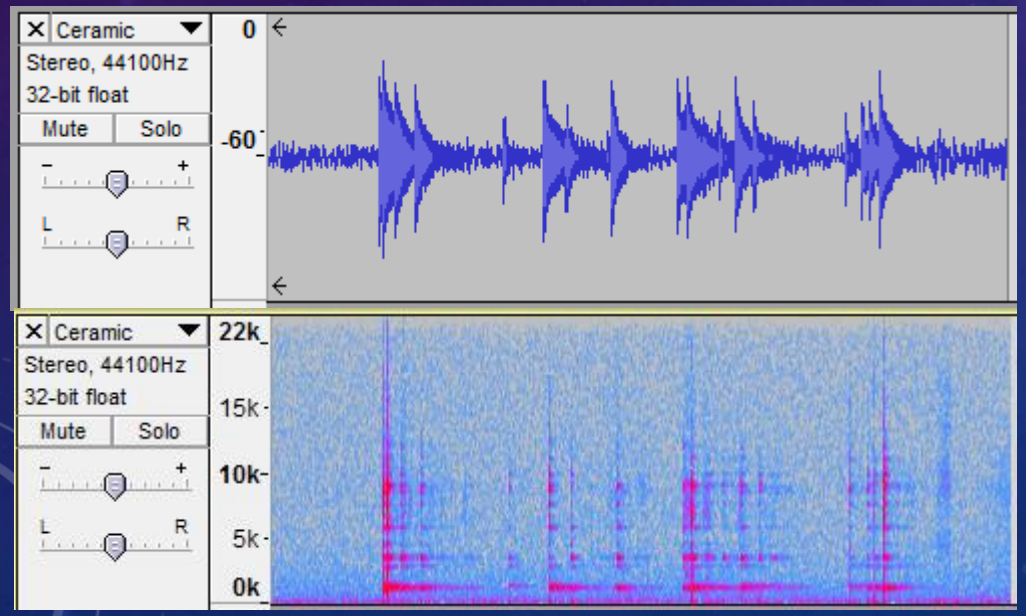
Reed Wind Sound

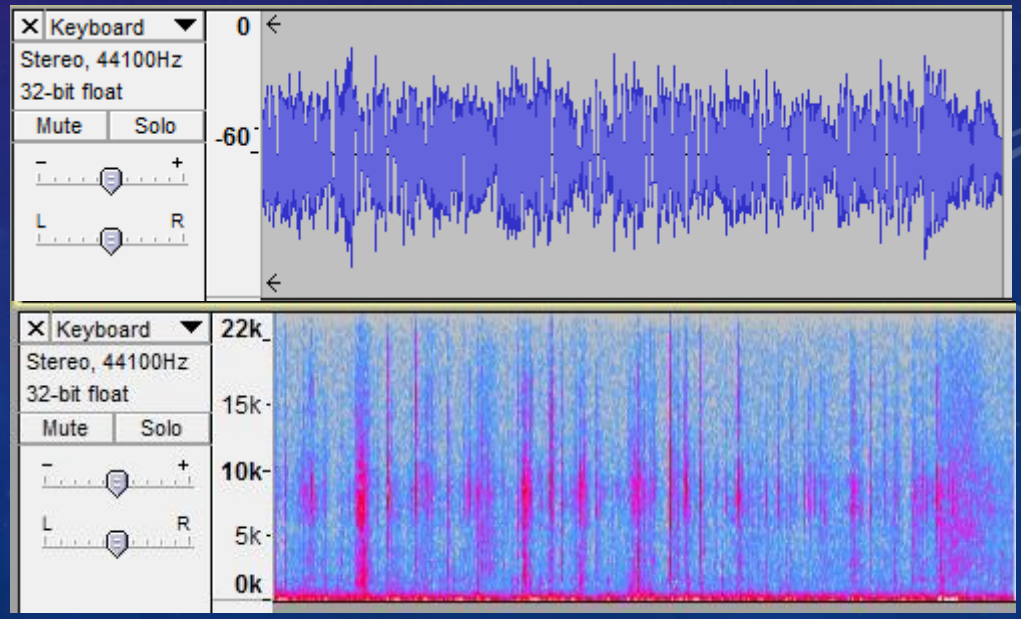
(Ahn et al, 2019)

EXAMPLES OF ASMR



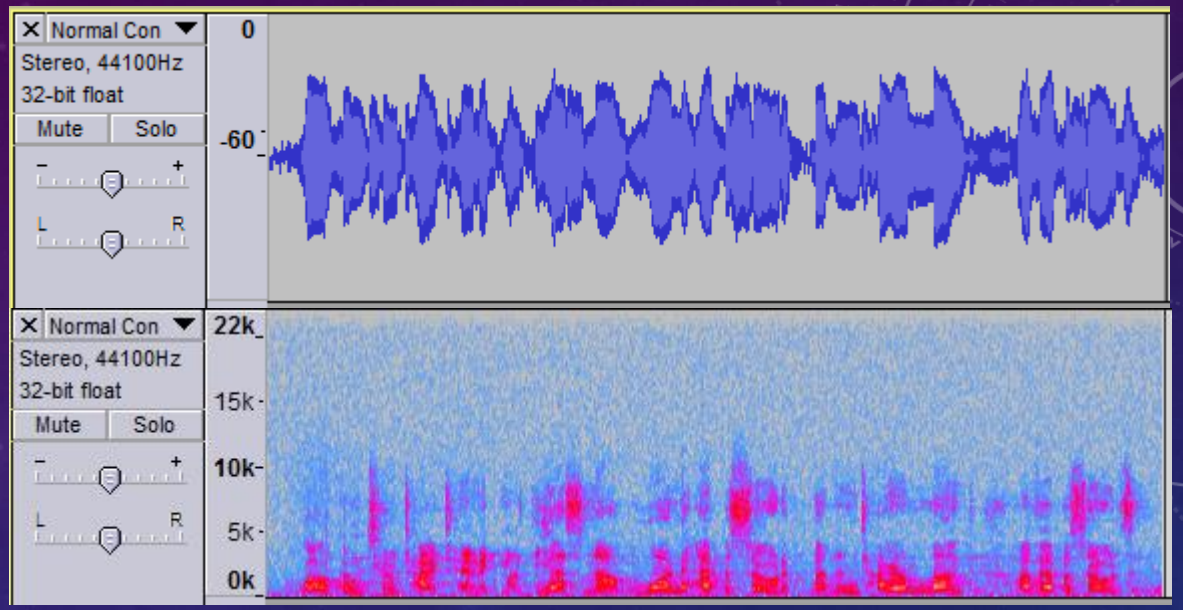


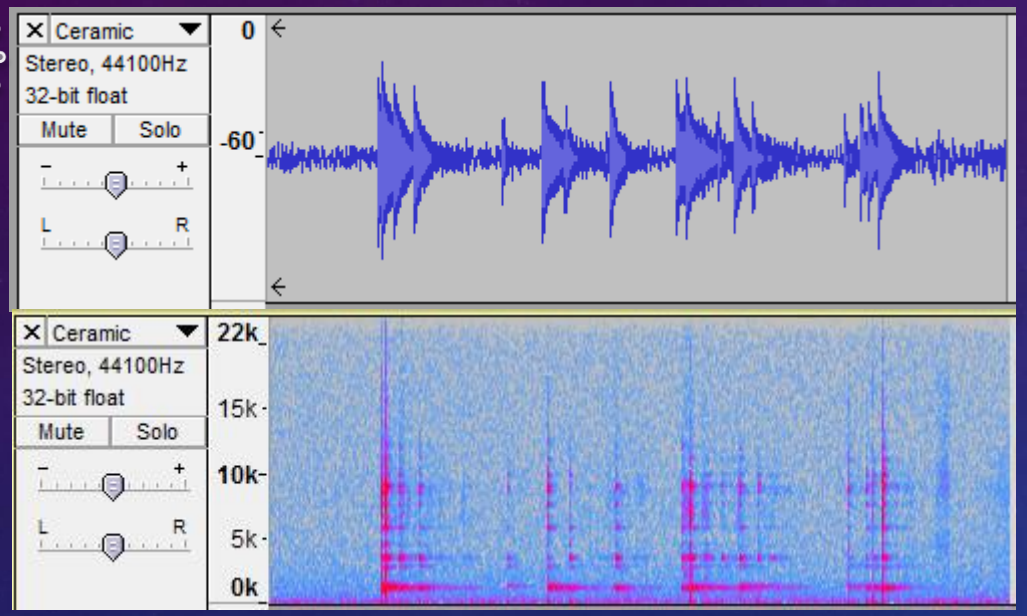


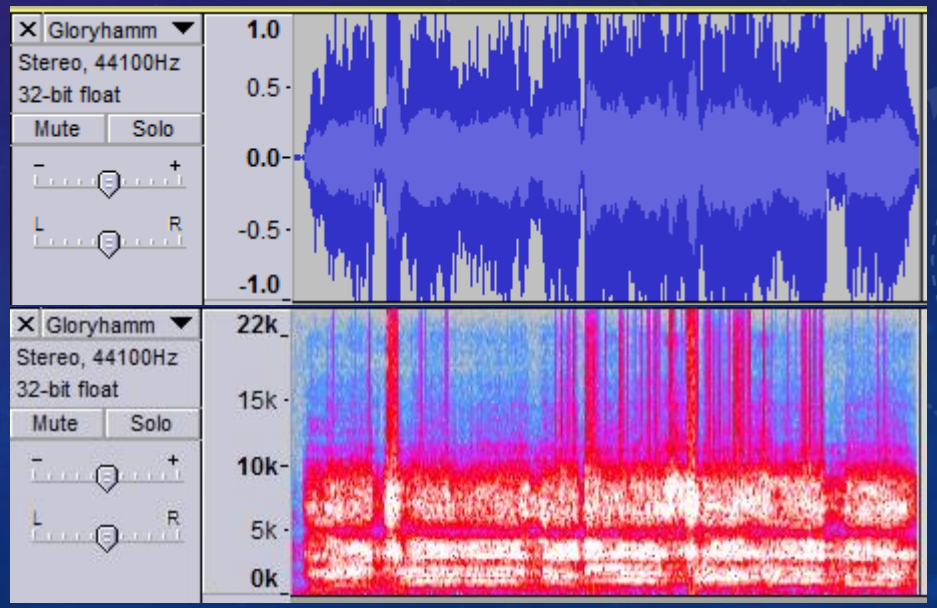


COMPARISONS

Tasting History with Max Miller,
https://youtu.be/JbmHZbTpoDY







Legend of the Astral Hammer by Gloryhammer

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