

# Analysis of the Similarity and Characteristics between Death Whistle Sound and Human Screams

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## Abstract

In 1999, a clay whistle was found beneath the grounds of the Quetzalcoatl Temple in Telatelo, Mexico City. It was the whistle of death that made the most feared sound of man. At the time of discovery, scholars thought it was just a trinket, but it turned out to be a very creepy musical instrument by scholars who accidentally play it 15 years later. This clay instrument shocked many scholars and people because it sounded like a soul-screaming scream. Since then it has been called the Aztec Death Whistle. According to research, the early death whistle was made by cutting and burning the enemy's neck during Aztec civilization, then applying clay to the skull. It was then studied that it was made in large quantities using clay. Scholars continue to study the creations of this ancient Aztec civilization. There are several hypotheses for the use of this death whistle. There are theories that it was used as a tool for overbearing during the war and that it was used to hunt religious sacrifices necessary for human sacrifice. Indeed, if you look at the temple of the Quetzalcoatl, where the death whistle was discovered in large quantities, the hypothesis that it was used for the ritual of human sacrifice is also strong. In this paper, based on the acoustic research, the similarity and fear of the death whistle and the screams of men and women were analyzed. As a result, it was confirmed that this musical instrument resembled the scream of a person, and among them, it sounded like a scream when it felt fear, causing more fear. Among the screams of a person when feeling fear, the scream of a woman was more similar to that of a death whistle. Death Whistle's low-frequency burst sound was similar to the frequency characteristic of a scream when a person felt fear.

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## I. Introduction

The beheaded remains of a young man in his 20s, found in the grounds of Citi, Mexico, held a small skull-shaped ornament in his hand. Scholars at the time were not interested in it for 15 years because they thought it was just an ornament. After that, some scholars were interested in the ornament and actually played it. As a result, They were very surprised that it sounded similar to a person's scream. The study found that the place where the

skull-shaped ornament was found was the site of the wind god believed by the ancient Aztecs, and the ornament was closely related to the religious culture of the Aztecs. It was said that the culture of the ancient Aztecs at that time had a human-life culture that sacrificed living humans to please the gods. In order for them to sacrifice living human beings, they had to battle the weak tribes of the surroundings and take prisoners alive and make them sacrifices. In order to catch the victim, who

would be a sacrifice, he had to make a temporary impotent so that he would not die by using a blunt weapon. Of course, they would have used their sharp weapons to overcome the opposition. However, in order to catch a lot of prisoners alive, it was also necessary to drastically reduce the morale of the other person and to induce surrender by scaring. It turned out that the very same skull-like ornaments were used as a tool to scare the opposing tribe and reduce morale. The skull-shaped ornament is a whistle that sounds like a scream made by humans, and was named Death Whistle. During the war against the tribesmen, the Aztecs had dozens to hundreds of death whistles at the top, dropping the morale of the tribesmen and holding humans alive as slaves or sacrifices. The screams that emanate from the death whistle of dozens and hundreds of people are enough to dislodge the enemy's demeanor. Anyone who directly hears the death whistle will admit it.

## II. Death Whistle

The Death Whistle was held in the hands of a skeleton found in the grounds of the Quetzalcoatl Temple in Telatelo, Mexico City in 1999. When archaeologists first discovered this, they were skull-shaped, but thought of as simple toys. It wasn't until 15 years later that They thought it was a tool similar to a whistle, and I was all surprised when I heard the sound that occurred when it was blown. This is because the wind came out of the nostrils of the skeleton-like clay doll, making it sound like a human scream. Many scholars and people who thought this was just an ornament were in shock. This whistle made a terrible sound like a human scream. It is still unclear where the death whistle was written. Several hypotheses are known, including the theory that it was used to subdue enemy during the war, the theory that it was used to hunt sacrifices necessary for religious rituals, and that it was used only for disease healing and funeral rituals. It is now sold as a tourist product at tourist attractions in Mexico City.[1]

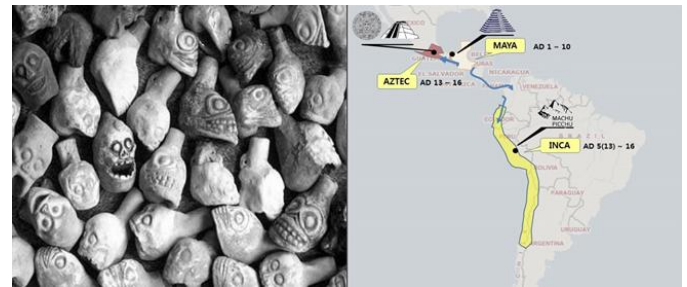


Figure 1. Death Whistle of the AZTEC

When the Death Whistle was discovered, the Aztec Empire was said to have been a great empire with a huge population. Aztec civilization is famous as an ancient civilization, but It is a known civilization with cruel culture. It is a known civilization. Death whistle is also a link to the cruel culture of Aztec civilization. If you hear the sound, you will immediately know the role of Death Whistle. Death Whistle is said to be closely related to the Aztec people's culture. The Aztecs are said to have sacrificed living human beings. To sacrifice a living human, the victim must be captured alive. The Aztecs have discovered a way to extort resistance by terrifying their fears in order to capture humans alive. Evidence that a human being to be used as a sacrifice was alive can be confirmed as the main weapon of the Aztecs at that time was blunt weaponry. It can be assumed that the main purpose of using a blunt weapon was to injure and temporarily incapacitate rather than kill the other person. Death Whistle seems to have served as an aid to capture victims of sacrifices, in addition to these blunt weapons. It was an aid to losing resistance by putting the other person into fear. On the other hand, there is speculation that it might have been used in war. The Aztecs seemed to be a tribe of effective use of human psychology in war. Aztec warriors are also known to play wooden drums to reduce the morale of enemy soldiers as battle progresses, and Death Whistle may have been used in war for similar purposes. If you heard the death whistle on the battlefield, you would have had a hard time losing your sense of war or fighting with fear. Death whistle, in particular, is said to be

more like the screams of a screamer in a terrifying horror situation. Among them, it is more similar to the scream of a woman, but it is said that the woman's scream was used to lure enemies by invoking a protective instinct to military men. Death Whistle is a speculation that it might have been used to gain an edge in war by breaking the other's momentum and terrifying fear. Or you may have used a wooden drum or death whistle to fill the number of allies you lack. Even if there are only 200 or 300 allies, if you hit a wooden drum or blow a death whistle, it may be exaggerated as if there were 5,000 warriors. There is a theory that death whistle was used to hunt for the sacrifices necessary for human sacrifice, and that it was used as a tool for overwhelming war. Indeed, if you look at the temple of the Quetzalcoatl that was discovered in large quantities, it would have been used for rituals during human sacrifice. The hypothesis is more potent.

The Death whistle cross section is similar to human larynx. When making a death whistle, there is no record to confirm whether it accidentally made a shape similar to the human body's occipital structure or made a death whistle with reference to the human body's occipital region. If it were the latter, it is possible to guess how well the Aztec priests and tribal leaders were anatomically versed in the structure of the human body at the time of the death whistle. Or, at that time, the Aztecs may be familiar with the structure of the occipital region, because dissection of the human body is uncommon. It is said that the Aztec civilization created a death whistle by cutting and burning the enemy's neck and then applying clay to the skull. Death Whistle is the most unpleasant musical instrument in the world, when a hole is blown through the crown or back of a human skull and wind blows through the skull and leaks toward the nostrils. Then, in order to make musical instruments from the beginning, did you dig a hole in a human skull and put a fire on it? Or was it that the brain in a human skeleton was sucked up by sucking a straw and then playing with it and then blowing it while playing with it? It is a

pretty brutal guess, but it cannot be ruled out from the prehistoric era. In any case, the first principle of death whistle is that it is a musical instrument made with the principle that when a hole is blown through the crown or back of the human skull, the wind passes through the skull and leaks toward the nostrils.

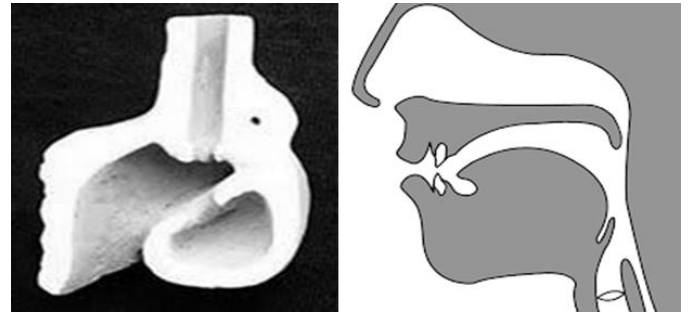


Figure 2. The structure of a Death Whistle

In fact, the Aztec priests' anatomical knowledge is often degraded just because of the Stone Age civilization, and the priests who practiced human sacrifices may have been masters of human disintegration. For example, according to a study that analyzed the skulls of Choppantley's 670 bodies actually found in Mexico City, there were traces of neat muscles and flesh sculpted by sharp obsidian blades, revealing their professional slaughtering skills. It is said that the cross section of the victim's skeleton was very uniform and clean.[2][3][4]

### III. Death Whistle Sound and Human Scream Comparison Analysis

The death whistle and death whistle of the Aztec Empire have a tone that inspires fear, so it is no exaggeration to say that it is the sound of the devil. Death whistle sounds similar to human screams. Death Whistle has a common tone that male screams and female screams have. Just as there are various types of death whistle, the sounds are various. However, the basic frequencies are maintained in common. Likewise, the screams of men are different from the screams of men and the

screams of women, and the screams of men are varied and the screams of women are also varied. Among them, I found and compared the sounds that sounded the most, and it was the screams when I felt fear. Among the sounds of death whistle, a death whistle sound very similar to the scream of a person was selected, and among the screams of men and women, the sound most similar to the death whistle was selected and frequency analysis was performed. Several male and female screams were collected to obtain samples of human screams. Among them, male and female screams most similar to the death whistle sound were selected and the death whistle sound and frequency were compared and analyzed.[7][8] Acoustic analysis is based on three elements of sound. Acoustic analysis includes time domain analysis, spectrogram analysis and spectrum analysis. The time domain analysis analyzes the size and continuity of the sound, the spectrogram analyzes the energy by the pitch of the sound, and the spectrum analyzes the characteristics of the tone by frequency band. A tool for acoustical analysis of Death Death Whistle and Scream of human used Adobe's Cool Editor program. The size and continuity of sound are analyzed by time domain waveform, sound component and energy by spectrogram, distribution of sound band by band and overall frequency characteristic by spectrum. The analysis of these frequency components uses the FFT concept to obtain the results.

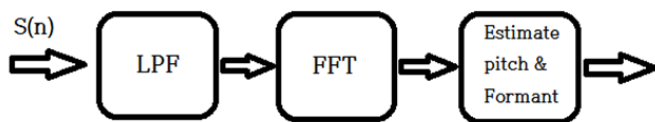


Figure 3.FFT diagram for obtaining sound information

Figure 3 is a diagram of the process of digitizing an analog sound signal by Fast Fourier Transform (FFT). As a first step in digitizing an analog signal, a low-pass filter (LPF) is performed to pass a low-frequency signal while filtering out a large amount of noise at a high frequency.

Next, the sound signal is transformed so as to be easy to analyze by using fast Fourier transform. Through such a process, we provide a basis for analyzing pitch and formants of acoustic frequencies. [9][10]

Spectrogram analysis is a method of analyzing the energy distribution situation of each sound over time. Analyze the structure of sound components and compare the sound of death whistle with the sound components of man and woman scream.

The similarity of each frequency component was measured by the following equation.

$$Frequency\_energy = \frac{1}{N} \left[ \sum_{n=1}^N (FE_1(n) - FE_2(n))^2 \right] \quad (1)$$

The difference of each frequency component was analyzed by the above equation and sound information was measured.[11][12]

The spectrogram of death whistle and human screams concentrates high energy around 1,000 Hz and shows a graph of energy dissipation as a whole. This is a characteristic that appears in a husky-type voice, and is a sound energy characteristic that can be seen in a scream that is emitted when a fear is felt among the screams. The reason for this is that when the fear is extremely felt, the prayer and the gates do not work smoothly, so the sound becomes a burst.

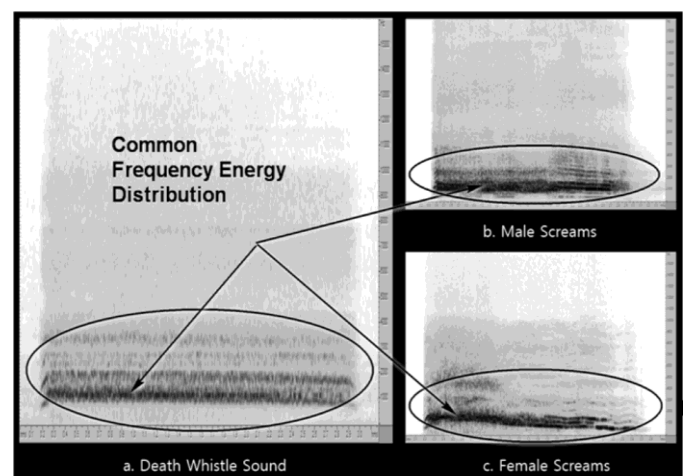


Figure 4. Comparison of death whistle and scream of man and woman

The spectrogram in Figure 4 is a spectrogram graph comparing the sound components by selecting one of the most similar sounds among death whistle and male and female screams. The death whistle sound and the scream of a person who have similarities with each other form a spectrogram that shows uniformly strong energy around 1,000 Hz for about 2 seconds. Among them, the energy components of women's screams and death whistle are very similar energy distribution before and after around 1,000Hz.

Spectrum analysis is a graph for analyzing the sound characteristics through the distribution status of each frequency of sound. It can be said that the overall characteristics and specific characteristics of the sound can be seen at a glance.

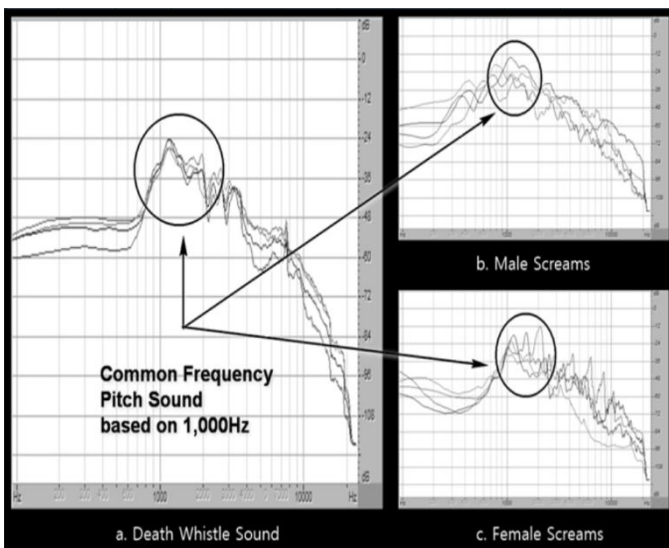


Figure 5. Spectrum comparison of death whistle sound for male and female screams

Figure 5 is a graph comparing various screams of a man and various screams of a woman among various death whistle sounds and human screams. As shown in Figure 5, the characteristics of the death whistle and the screams of men and women show a common point showing the pitch frequency based on 1,000 Hz. Among the sound of death whistle, the sound similar to the scream of the human was selected, and the sound similar to the

death whistle of the male and female scream of the human sound was selected and compared with each other.

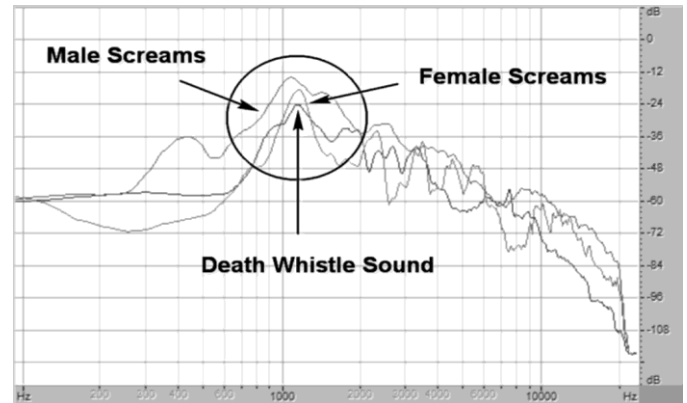


Figure 6. Spectrum comparison of death whistle sound for male and female screams

Among the whistle and death screams of men and women, the ones most similar to each other were collected and compared. As a result, these three sounds had very similar sound characteristics when heard through human hearing. The similar sound characteristic was the scream that emanates when you feel fear. Screams can be largely divided into screams when you are surprised and screams when you are afraid. Among them, the scream of a person similar to the death whistle was the scream of fear. More specifically, as shown in Figure 6, the screams emitted when a woman felt fear was more similar to the death whistle than the screams emitted when a man felt fear. It can be seen that the frequency characteristic of the death whistle sound and the frequency characteristic of the female scream sound are very similar at the peak point of the 1,000 Hz band or the distribution status of the entire frequency band.[13][14]

The male scream and the female scream, which are most similar to the death whistle, were selected and heard by people, and a morse test was performed to express the similarity and fear with scores. For the experiment, 5 listeners were selected without distinction between male and female, and the death whistle sound and the male

and female screams were heard to record the similarity and fear of each other as scores. The score is the highest 5score for each of the similarity score and the fear score. [15][16][17]

both the similarity score and the fear score were high with 4~5 points. Of course, when selecting a sound, among the various death whistle sounds and various male and female screams, the most similar sounds were selected, so it is natural that the similarity score was high. The reason why the score of fear is high is also a score that can come out because the sound of death whistle and the sound of a man and woman similar to each other when heard through human hearing were screams emitted when fear was felt.

#### IV. CONCLUSION

The Aztec Empire is said to have forcibly ruled the neighboring tribes. It is said that he had an army strong enough to suppress the rebellion of other tribes with overwhelming military power. However, after only a few years in the early 1500s, the Spanish invaders and other Mexican indigenous tribes who were persecuted by the Aztec Empire perished. Because of the enormous cannibalism and the unique culture of brutality, the natives of other regions would have lived in fear until the destruction of the Aztec Empire. If you have attacked this death whistle with dozens to hundreds of people, you will not be able to guess the fear. So how much is Death Whistle like a human scream? Various death whistle sounds and various male and female screams were compared and the similar sounds were selected and analyzed. As a result, it was analyzed that the death whistle sound is very similar to the scream sound emitted when humans feel fear among male and female screams. When the fear was felt, the sound of death and whistle sounded similar to that of the male and female emanating, so the person who heard the sound would feel more fear. Also, the scream of a woman in fear was more similar to that of death whistle than the scream of a man in fear. The Aztecs were able to subdue opponents using death whistle because they knew the principle that fear brings fear. Through this paper, it was possible to know the Aztecs' war techniques or the unique side of religious culture, and it was confirmed that he had the tactics to subdue

opponents using psychological factors at the time.

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#### REFERENCES

- [1] Roberto Velazquez, Death whistle, The Journal of the Acoustical Society of America, Volume 128, Issue 4, 10.1121/1.3508553, Inst. Virtual Tlapitzac alzin, Trujillo 726, Col. Lindavista, DF, C.P. 07300, Mexico City, Mexico Francisco Rivas Castro 2389, 2010.
- [2] E. M. Dadlez, Pleased and afflicted: Human on the paradox tragic pleasure, Hume Studies, Published by Hume Society, Volumn 30, Number 2, November 2004, pp.213-236(Article)
- [3] Ik-Soo Ahn, Hyung-Woo Park and Myung-Jin Bae, " A Study on a Foley Sound of Tiger Roaring Sound," BRIS Journal of Advances in S & T, MAGNT Research Report, ISSN:1444-8939(ISO-indexed), Vol.3, No.9, pp.293-298, Dec 2015.
- [4] Ik-Soo Ahn and Myoung-jin Bae, "Study on a Foley Sound of Stepped on Snow," International Information Institute, Information: An International Interdisciplinary Journal, ISSN:1343-4500(SCOPUS indexed), Vol.18, No.10, pp.4123-4130, October 2015.
- [5] Ik-Soo Ahn, Seong-Geon Bae and Myung-Jin Bae, "A Study of Sound Contents Development based on Analysis and Compare Foly Sound to Actual Sound of Wind ", International Journal of Engineering and Technology, ISSN:0975-4024(SCOPUS indexed), Vol.7, No.3, pp.951-955, JUN-JUL, 2015.
- [6] Ik-Soo Ahn and Myoung-jin Bae, "Developed Foly Sound Contents using Analysis the Sound of Horse Hoof", International Information Institute, Information: An International Interdisciplinary Journal, ISSN:1343-4500(SCOPUS indexed), Vol.18, No.4, pp.1301-1306, April 2015.
- [7] Ahn Iksoo, Myungjin Bae and Seonggeon Bae, "An analysis the actual sound and Foley sound at stepping on dead leaves," Acoustical Society of America, Journal of the Acoustical Society of

- America, ISSN:0001-4966(SCI indexed, impact factor 1.55), Vol.137, No.4, pp. 2204-1~7, April 2015.
- [8] Ahn Iksoo, Myungjin Bae and Seonggeon Bae, "A study on sound contents development based on analysis a Foley sound and a real sound of thunder ," Acoustical Society of America, Journal of the Acoustical Society of America, ISSN:0001-4966(SCI indexed, impact factor 1.55), Vol.137, No.4, pp. 2204-8~14, April 2015.
- [9] Ik-Soo Ahn, Myung-Sook Kim and Myung-Jin Bae, " A Study on the Foley Sound Effect of Ocean Waves " , International Information Institute, Information: An International Interdisciplinary Journal, ISSN:1343-4500(SCOPUS indexed), Vol.17, No.12(B), pp.6543-6550, Dec. 2014.
- [10] Ahn IK, Yun JS, Bae MJ, "A Study on the Effect of Automobile Engine Knocking Sound on Driver's Psychology", Proceedings of IEEK, pp.993-994, 2016.
- [11] S.G. Bae, M.S. Kim, and M.J. Bae, " On Enhancement Signal Using Non-uniform Sampling in Clipped Signals for LTE Smart Phones," 2013, IEEE ICCEberlin, pp.125-126, ICCE-berlin 2013.
- [12] Ik-Soo Ahn, Seong-Geon Bae, Myung-Jin Bae, "A Study on the Possibility of Retaliatory Driving against Car Klaxon's Sounds " , International Journal of Applied Engineering Research ISSN 0973-4562 Volume 13, Number 3 (2018) pp. 1578-1585, 2018.
- [13] Ik-Soo Ahn, Seong-Geon Bae, Myung-Jin Bae, "A Study on Warning Sound for Drowsiness Driving Prevention System " , International Journal of Applied Engineering Research ISSN 0973-4562 Volume 12, Number 24 (2017) pp. 14088-14094, 2014.
- [14] Ik-Soo Ahn, Myung-Jin Bae, "On a Foley Sound Content of the Bird's Song", INFORMATION, Vol.20, No.2A, 2017.
- [15] Seong-Geon Bae, Myung-Sook Kim, and Myung-Jin Bae, "Using High Frequency Accentuation in Speech Signals as a New Parameter in Intoxication Judgment. Information, " An International Interdisciplinary Journal, Vol. 17 (2014), pp.6531-6536, 2014.
- [16] Seong-Geon Bae, Myung-Jin Bae, "A New Speech Coding using Harmonics Emphasis Filter, " ISAAC 2013, AACL Vol. 1(2013), pp.43-44, 2013.
- [17] Seong-geon Bae, Myungsook Kim, Myungjin Bae, " On Evaluating Various Music Genre for Relieving Symptoms of Depression", IJCC2016, Advanced and Applied Convergence letters(ISSN 2288-6060), Vol.-AACL07, pp.247-248, Hanoi, Vietnam, Jan. 18-22, 2016.