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Investigation of the frequency Response of Shankha

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ABSTRACT: Shankhaare the one of the naturally occurring filter of sound. In this research work effect of shape and size on the filtering phenomenon of shankha are investigated. Six different shape and size of shakha are taken and sound of varying frequencies is passed through them. The output sound is recorded are stored for post processing. Amplitude and gain of the recorded sound is computed and compared with original sound.

KEYWORDS: Shankha, Frequency, Amplitude, Gain.

I.INTRODUCTION

Sound lies at the very center of verbalization communication. A sound wave is both the cessation product of the verbalization engenderment mechanism and the primary source of raw material utilized by the listener to recuperate the verbalizer's message. Because of the central role played by sound in verbalization communication, it is paramount to have a good understanding of how sound is engendered, modified, and quantified. The purport of this chapter will be to review some rudimentary principles underlying the physics of sound, with a particular fixate on two conceptions that play an especially paramount role in both verbalization and aurally perceiving: the concept of the spectrum and acoustic filtering. The verbalization engenderment mechanism is a kind of assembly line that operates by engendering some relatively simple sounds consisting of sundry coalescences of buzzes, hisses, and pops, and then filtering those sounds by making a number of fine adjustments to the tongue, lips, jaw, soft palate, and other articulators [1-3].

Following are the categories under which sound field can be defined.

- Free field: The free field is a region in space where sound may propagate free from any form of obstruction.
- Near field: The near field of a source is the region close to a source where the sound pressure and acoustic particle velocity are not in phase. In this region the sound field does not decrease by 6 dB each time the distance from the source is increased (as it does in the far field). The near field is limited to a distance from the source equal to about a wavelength of sound or equal to three times the largest dimension of the sound source (whichever is the larger).
- Far field: The far field of a source begins where the near field ends and extends to infinity. Note that the transition from near to far field is gradual in the transition region. In the far field, the direct field radiated by most machinery sources will decay at the rate of 6 dB each time the distance from the source is doubled. For line sources such as traffic noise, the decay rate varies between 3 and 4 dB.
- Direct field: The direct field of a sound source is defined as that part of the sound field which has not suffered any reflection from any room surfaces or obstacles.
- Reverberant field: The reverberant field of a source is defined as that part of the sound field radiated by a source which has experienced at least one reflection from a boundary of the room or enclosure containing the source [4-5].

The word Sankara could have been derived from Sankha-kara which means conch-blower (hankha = conch, Kara = blower). The shankha is praised in Hindu scriptures as a giver of fame, longevity and prosperity, the cleanser of sin and the abode of Lakshmi, who is the goddess of wealth and consort of Vishnu. It is also used as a container for

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holy water (shankha teertham). The shankha (conch shell) mudra is also used during various tantric rituals and meditation. The sound of the conch is associated with the sacred syllable AUM, the first sound of creation. Conches that spiral clockwise are said to symbolize the expansion of infinite space. These conches belong to Lord Vishnu, the preserver god. Conches that spiral counterclockwise are said to defy the "laws of nature," and belong to the destroyer/transformation god, Lord Siva [6-7]. A powder made from the shell material is used in Indian Ayurvedic medicine, primarily as a cure for stomach ailments and for increasing beauty and strength. Shankha is used in Ayurveda medicinal formulations to treat many ailments. It is prepared as conch shell ash, known in Sanskrit as shankha bhasma, which is prepared by soaking the shell in lime juice and calcinating in covered crucibles, 10 to 12 times, and finally reducing it to powder ash. Shankha bhasma contains calcium, iron and magnesium and is considered to possess antacid and digestive properties. A compound pill called shankavati is also prepared for use in dyspepsia. In this case, the procedure followed is to mix shankha bhasma with tamarind seed ash, five salts (panchlavana), asafoetida, ammonium chloride, pepper, carui, caraway, ginger, long pepper, purified mercury and aconite in specified proportions. It is then triturated in juices of lemon and made into a pill-mass. It is prescribed for vata (wind/air) and pitta (bile) ailments, as well as for beauty and strength [8-9].

II.METHODOLOGY

The research work is carried to investigate the filtering capabilities of Shankha. Different sound signals having frequencies 100 Hz, 500 Hz, 1 KHz, 5 KHz, and 20 KHz were processed through six different Shankha. Figure 1 shows the Shankha used in the research work. The dimensional parameters are given in Table 1.

Fig. 1 Shankha used in research work.

Table 1 structural parameters of shankha.

Shankha No.	Weight (gm)	Length (cm)	Internal Diameter (cm)
S1	358	16	25
S2	240	14	21
S3	556	21	31
S4	164	12	20
S5	200	10	18
S6	502	17	29

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In this experiment five different frequency sinusoidal signal in audible range are passed through all the six shankha. The frequencies taken for the experiment are 100 Hz, 500 Hz, 1 KHz, 5 KHz, and 20 KHz. The gain of the recorded signals is computed.

III.RESULT AND DISCUSSION

Investigation were carried out to analyze the effect of signal frequency on sound processing capability of shankha are estimated. Five set of sinusoidal signals having frequencies 100 Hz, 500 Hz, 1 KHz, 5 KHz, and 20 KHz and amplitude 0.5 dB were taken and passed through the shankha. The recorded signals were analyzed in Praat software. The amplitude and gain of signal is tabulated and plotted. Table 1 and Table 2 shows the amplitude and computed gain of recorded signal with frequencies 100 Hz, 500 Hz, 1 KHz, 10 KHz, and 20 KHz. At 100 Hz frequency increase in amplitude and gain factor is observed in case of S2 shankha and decrease in altitude is seen for rest of shankha. At 500 Hz frequency shankha S1 and S3 have higher amplitude response then other shankha. At 1 KHz, shankha S1, S3, and S5 have higher amplitude as compared to original signal and rest of the shankha have low amplitude than original signal. At 5 KHz, shankha S1, S3, S4, and S5 have higher amplitude as compared to original signal and rest of the shankha have low amplitude than original signal. At 20 KHz, shankha S1, S2, S4, and S5 have higher amplitude as compared to original signal and rest of the shankha have low amplitude than original signal. Figure 2 and Figure 3 shows the amplitude and gain of recorded signal at different frequencies.

Table 1. Amplitude and gain of recorded signal at different frequencies.

Shankha	Amplitude (100 Hz)	Gain (100 Hz)	Amplitude (500 Hz)	Gain (500 Hz)	Amplitude (1 KHz)	Gain (1 KHz)
S1	0.01477	0.02954	0.3821	0.7642	0.9852	1.9704
S2	0.07532	0.15064	0.1913	0.3826	0.3235	0.6470
S3	0.00643	0.01287	0.3645	0.729	0.6353	1.2706
S4	0.01617	0.03234	0.1899	0.3798	0.1707	0.3414
S5	0.02582	0.05164	0.2773	0.5546	0.9245	1.8490
S6	0.03650	0.07300	0.04312	0.8624	0.02811	0.0562

Table 2. Amplitude and gain of recorded signal at different frequencies.

Shankha	Amplitude (10 KHz)	Gain (10 KHz)	Amplitude (20 KHz)	Gain (20 KHz)
S1	0.985	1.97	0.985	1.97
S2	0.2026	0.4052	0.985	1.97
S3	0.985	1.97	0.3509	0.7018
S4	0.6694	1.3388	0.9851	1.9702
S5	0.985	1.97	0.985	1.97
S6	0.2729	0.5458	0.2427	0.4854

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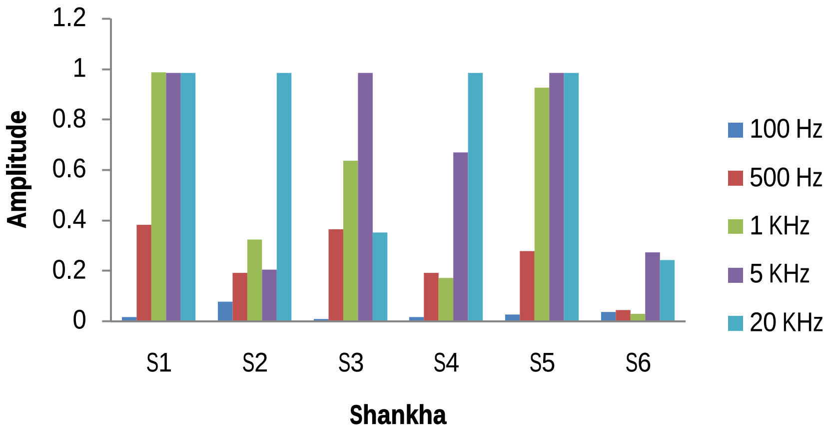

Fig. 2 Amplitude of recorded signal from different shankha.

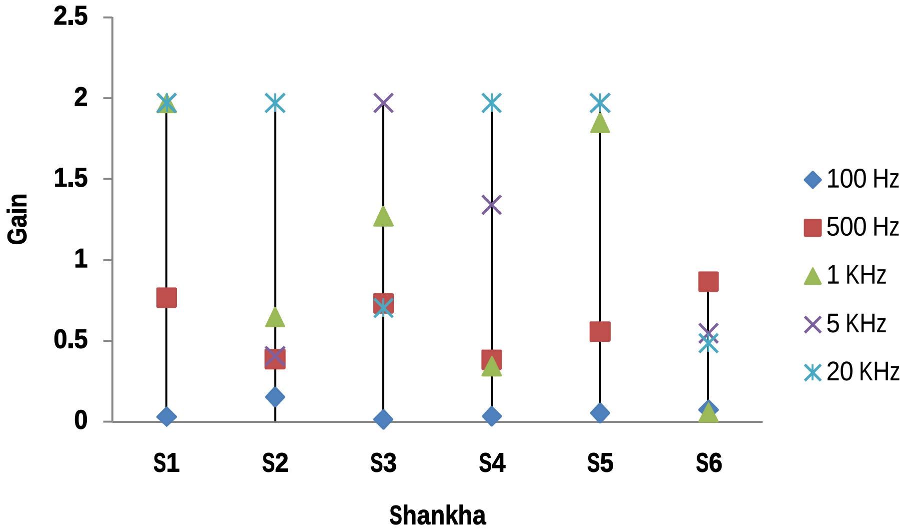

Fig. 3 Gain of recorded signal from different shankha.

VI.CONCLUSION

Research work is carried out to investigate the filtering phenomenon shankha. Six different shape and size of shakha were taken and five different frequency sinusoidal signal with amplitude of 0.5 dB was taken and passed through these shankha. It is observed that depending upon the shankha shape and size, the sound is amplified by the shankha.

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