

MANIFESTATIONS OF PHYSICS IN YORUBA CULTURE

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ABSTRACT

The early Yorubas were intensely environmental and outdoor people. Hence through repeated observations and logical projections, they were able to understand and practice some aspects of fundamental physics. This paper aims to illuminate some of these elements and manifestations within the framework of contemporary physics.

INTRODUCTION

The early Yorubas perceived and conceived 'science' especially 'physics' in their own context as being an admixture of three factors: natural, prenatural and supernatural. There was tremendous surge of interest as the nature of man's mind and his environment among the early Yorubas.

The connection between elements of physics and culture is not only very interesting but also extremely important. The root of these elements are to be found in the distant past of the early Yorubas, in a culture where science, philosophy, practices and religion were not separated. Their aim was to discover the essential nature or reconstitution of things. Elements of physics, therefore, did have historical roots in several ancient cultures especially that of the early Yorubas.

The uniqueness of scientific observations marked science as belonging to the general category of cultural creative activities along with literary, musical and other forms of artistic creativity. Cultural patterns reflect social structure in which the rational and the empirical traditions are maintained by different and unequal groups or classes within society. The former by intellectuals, who have comparatively high status and the latter by craftsmen whose status is comparatively low. It was the progress towards the integration of the two that produced the elements of scientific ideas and practices among the early Yorubas.

Environmental Physics of the Early Yorubas

The early Yorubas were intensely environmental and outdoor people. Hence their thoughts were modulated by observations of activities in their environment. Hence through repeated observations and logical projections, they were able to understand and practice some aspects of fundamental Physics especially scientific predictions within allowable error limits.

The early Yorubas were aware that in the hours or days before the arrival of a storm, animals became restive and insects suddenly erupted with an explosion of energy and became a plague instead of a nuisance. Hence if livestock became restless and the bugs began to bite more than usual then they predicted a storm was probably on the way.

In contemporary physics, the weather changes when one atmospheric front is shoved out of the way by another. If there are rain clouds, the rubbing of the new front against the old, and of cloud against cloud, commonly causes thunderstorms because the rubbing sets up a positive charge that flashes to the negatively-charged earth as lightning, destroying the overdose of positive ions as it does so. But the electrical disturbance

moves faster than the weather front, so that hours or days before the arrival of a rainstorm the air is overloaded with positive ions which produces tremendous effect. Positive ions overdose affect the body chemistry of all creatures including human beings, livestock and insect as observed by the early Yorubas.

When the storm has passed, however the early Yorubas observed that the air is fresh, clean and invigorating. Human beings and other creatures in that environment feel vigorous, refreshed and at peace with the newly washed environment.

The storm's passage has cleansed the air of positive ions. What is left in the wake of the storm is a gloriously tranquilizing overdose of negative ions that eases tension and pressures and leaves creatures full of pleasant and productive energy. Not all moving weather fronts bring storms with them; they may simply bring slightly higher or lower temperatures, changes in air pressure or fewer or more clouds. Even so there is usually an advance guard of air carrying a heavy positive charge and the result is still the same.

Negative ions are therefore beneficial while on the other hand positive ions are unhealthy. Abundance of positive ions otherwise known as positive ion poisoning produces an overdose of stress – response neurohormones serotonin in human and animal systems.

The positive ions also affects the normal functioning of the thyroid gland. All these affect the body chemistry and physics thus causing among other things depression, despair, anxiety, fatigue, irritability, sleepiness, lack of concentration and an overall reduction in physical and mental efficiency. Over production of serotonin often causes horrifying nightmares and horribly disturbs good sleep (Krueger , 1976).

Health Physics of the Early Yorubas

Mountain tops, the sea shore and the waterfalls were considered “ sacred places” by the early Yorubas especially in terms of spiritual retreats, communication with their “deities”, conducive environment for recuperation from illness and sites for meditation, focusing and refocusing of the mind (especially for the then Yoruba high priests). In contemporary physics, however, in reasonable and logical agreement with the practices and observations of the early Yorubas, there are circumstances in nature that create overdose of the negative ions that are good for all creatures in the environment. In certain hill and mountain areas a combination of the sun's rays, cleaner air, rock strata that are more radioactive than most of the earth's surface can produce high concentrations of both kinds of ions, with the balance swinging heavily in favour of negative ions. In part this is because in the mountains there is less dust in the air to consume the negative ions. It is no coincidence that throughout history mankind had gone to hilly areas to rest and recuperate, particularly from respiratory disease.

The energy in moving water also generates a lot of negative ions since, as water breaks up, the positive charge remains with larger drops and negative charge flies free with fine spray, forming negative ions. By the shore, where waves bounce on beaches or hiss and sputter against the rocks, there are always more negative ions than positive ions. Waterfalls, too, are surrounded by a beneficial load of negative ions created by the same process. This explains why a shower is refreshing under any circumstances; the man-made mini-waterfalls produce a massive overdose of negative ions.

The early Yorubas had no conventional contemporary equipment to measure the incidence of solar flares. There was however enough oral evidence to suggest and affirm their knowledge of such solar activities. Contemporary knowledge has however corroborated the coincidence of the health observations of the early Yorubas with the period of solar activities especially the 11 – year sunspot cycle. Solar flare is a sudden brightening of the outer atmosphere of the sun in the vicinity of large sunspots, involving rather large amount of energy. At such times, particles, particularly electrons and protons are produced and stream into space along magnetic fields of the sun with velocities sometimes approaching very closely the speed of light. It is these fast, or relativistic electrons

which cause many of the radio burst from the sun at the time of flares. When this phenomenon was observed earth with its attendant health effects and incidence of solar related diseases, the early Yorubas under the cloak of traditional religious explanation, referred to these as the wrath of the sun (Olaitan, 1999)

Contemporary large – scale study has revealed an exact correlation between solar activity and white blood cell counts in normal people. Researchers have tracked down links between the sun, human and animal behavior and diseases (Gauquelin M. and Gauquelin F, 1975). Yagodinsky (1972) concluded that the solar cycle remains obstinately locked on to those of scarlet fever, malaria, polio outbreaks and heart diseases when the sun is unusually active similar to the health observations of the early Yorubas [‘ ile – gbona ’ (epidemics of influenza), ‘ onigba – meji ’ (cholera), ‘ sagbadiwere ’ (somnambulism), ‘ ita – aaganna’ (hallucination), ‘ olode’ (smallpox)].

Acoustic Physics of the Early Yorubas

The early Yorubas studied and researched into the acoustic physics of the human voice. Hence the invention of the talking drum (dundun, gangan) which played a major role in the array of other drums in Yoruba music physics and musicology like “bata, omele, iya-ilu, ogidigbo etc” all of which manifests elements of physics in their construction and applications.

Among the early Yorubas, “agbe” art is an important aspect of their culture. Agbe art (agbe singing) comprises the ideas, values and feelings by which the early Yorubas experienced their society at various times. Hence the need to understand the physics of human voice along with the associative drum technology. Agbe is a genre of Yoruba traditional oral poetry, which is still being practiced as a unique social entertaining and constructive poetic activity in some parts of Yorubaland. In a formal stage performance it is accompanied with agbe (stringed gourds-Yoruba violin), instrumental music and dancing.

The verbal compositions central to the social activity consisted mainly of praises, salutations and character sketches of individuals, current chronicles and random themes of moment.

Hence the full understanding of fundamental physics of the human voice and applications was central to this art. The early Yorubas considered the voice organ (which includes the lungs, the larynx, the pharynx, the nose and the mouth) as a generator of voice sounds. Functionally the organ has three major units: a power supply (the lungs), an oscillator (the vocal folds) and a resonator (the vocal tract). With the glottis closed and an air stream issuing from the lungs, the excess pressure below the glottis forces the vocal folds apart; the air passing between the folds generates a Bernoulli force (a physics phenomenon) that, along with the mechanical properties of the folds, almost immediately closes the glottis. The pressure differential builds up again forcing the vocal folds apart again. The cycle of opening and closing, in which the vocal folds act somewhat like the vibrating lips of a brass instrument player, feeds a train of air pulses into the vocal tract. The frequency of the vibration is determined by the air pressure in the lungs and by the vocal folds’ mechanical properties which are regulated by a large number of laryngeal muscles.

The resulting sound, the voice source, has a spectrum containing a large number of harmonic partials, the amplitude of which decreases uniformly with frequency. The air column within the vocal tract has characteristic modes of vibration, or resonances, called formants. Formants correspond to standing waves, or static patterns of air pressure oscillations in the vocal tract. As the voice source moves through the vocal tract each partial is attenuated in proportion to its distance from the formant nearest it in frequency. The formant frequencies thus appear as peaks in the spectrum of the sound radiated from the lips; the peaks establish particular vowel sounds.

Moving the articulatory organs is what occurs during speaking and singing. In fact the standing waves of the formants are changed to change their frequencies. Each articulatory configuration corresponds to a set of formant frequencies, which in turn is associated with a particular vowel sound.

However the early Yorubas also knew that it was in the complex of "scientific" knowledge; talent and musical instinct that was summed up as "musicality" rather than in the anatomy of the lungs and vocal tract that an excellent singer's excellence lay as evidenced in the mastering of the "agbe" art. However elements of physics played a major role both in practice and applications.

CONCLUSION

The early Yorubas had keen interest in their environment and its impact. They studied and observed periods leading to, during and after rainstorms and made observational predictions which manifested elements of Physics. They were able to predict imminence of rainstorms by the activities of livestock and insects hours or days before commencement.

The early Yorubas also knew that mountain tops, sea shore and the waterfalls were conducive environment and reserved areas for medical recuperation, meditation, spiritual retreats and other mind focusing activities in view of the abundance of negative ions in these areas.

The early Yorubas were aware of the correlation between solar activities(solar flares),the 11-year sunspot cycle and the attendant health effects even though these were often encapsulated in the cloud of religious explanations often referred to as the wrath of the sun, which can now be explained within the framework of contemporary Physics.

The early Yorubas studied and researched into the acoustic Physics of the human voice. Hence the invention of the talking drum, which is central culturally to the "agbe" art and the associative drum technology. The voice organ is an instrument consisting of a power supply (the lungs), an oscillator (the vocal folds) and a resonator (the larynx, pharynx and mouth). Singers in "agbe" art adjust the resonator in special ways to produce the desired result.

REFERENCES

1. Sulman F.G.(1974) "Influence of artificial air ionization on human electroencephalogram"
International Journal of Biometrology 18: 61-65
2. Krueger A. P. & Reed E.D 1976 " Biological impact of small air ion" *Science* 193:1209-1213
3. Olaitan H. M. (1999)"Environmental thermodynamic and electromagnetic effects in Yoruba solar physics"
Journal of African Philosophy and Studies. 12, (3) : 1-8
4. Guaquelin, M & Guaquelin, F. (1975) " Review of studies on biological effects of solar activity"
Journal of Interdisciplinary Cycle Research 6 (3) : 249-252.
5. Yagodinsky V.N (1972) " The cyclic nature of epidemics and heliomagnetic factors of external medium"
National Research Council of Canada. Technical Translation, Ottawa (1975) : 242-248.