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# CONTEMPORARY TECHNOLOGICAL PRINCIPLES AND APPLICATION IN THE CONSTRUCTION OF OJA (Igbo Wooden flute):

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## INTRODUCTION

Indigenous technology is one of the means by which man in culture manipulates his environment for his survival. It is the use of the mechanical arts and applied sciences in the production of materials or implements which man uses in his daily life. With regards to musical instruments, technology or organology is the application of the laid down principles for the production of musical instrument. *Oja* (Igbo wooden flute) is one of such instruments and which is the focus of this study.

## THEORETICAL FRAMEWORK

The study combines three models of theoretical frame work: the linguistic model, cantometrics and cultures own cognitive map models, all from Brunno Nettle. The linguistic model takes care of *oja* as a surrogate musical instrument that follows the tonal language of the culture to communicate; the cantometrics takes care of performance practice and the relationship of *oja* with different aspects of Igbo culture and beyond. Most important is the linguist aspect of *oja* which the traditional organologist must achieve in his construction. The cultures own cognitive map takes care of the cognitive aspects of *oja* in the various cultures and subcultures of the Igbo and beyond.

Most African musical instruments are sourced from the environment in which they are found. Africa is blessed with vast areas of forests within the vegetation zone and tropical region from where wooden materials of different types are sourced for use in the construction and manufacture of musical instruments.

Okafor, (1991) opines,

*Mastering of these various environments created the various cultural streams in the country. The artifacts that are the symbols of human development or civilization were made from materials extracted from or found in the local environment. p.166-175*

This implies that indigenous technology of what ever description or application is

therefore the application of knowledge of the qualities and possibilities of what abounds or exists in the environment, for the benefit, comfort or pleasure of man.

The designing and construction of musical instruments is an aspect of the African way of life through which African cultures develop their symbols of identity, and express themselves in their own way. The instruments are constructed by the community experts (indigenous technologists) in such a way that they are accepted by members of the community, hence every community in Igbo land has one instrument, most often, the giant slit drum, which is regarded as the symbol of the community. Igbo language is one of the tonal languages of Africa. The basic occupation of the indigenous technologist in every community is to construct the instrument to agree with the tonal language of the people Chukwu (2007) States that: 'Acceptability of musical instrument(s) generally depends on the culture of a people-the users of such instrument(s). This is because every constructed instrument from a particular group must agree with the tonal structure of the language of the people'. p.153

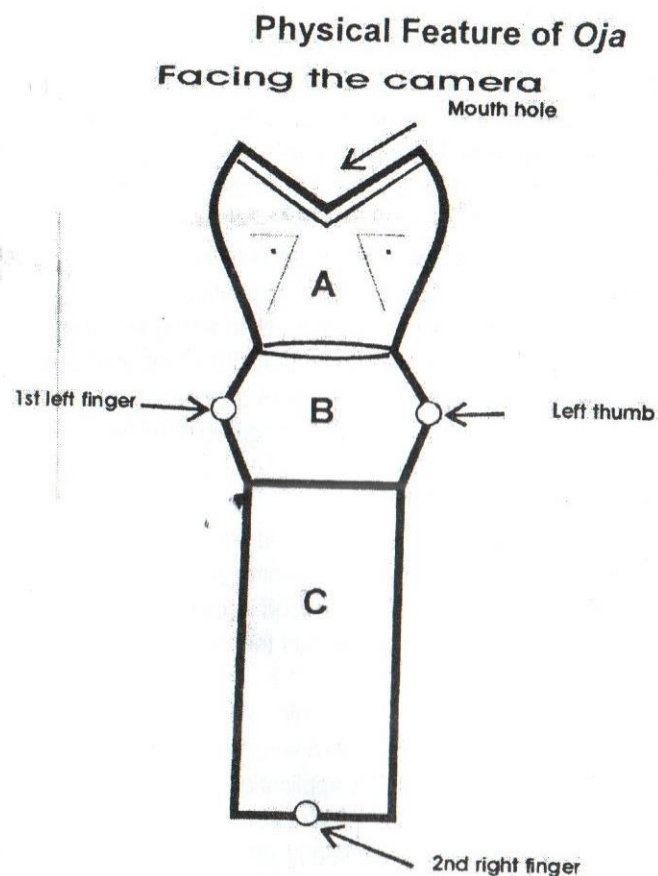
In industrialized societies like Europe and America, the details of such production and the scientific and artistic principles behind the production are documented and preserved, but in the folk or non industrialized societies like those in Africa, there is no such documentation, as only the indigenous technologist and his family retain the craft as part of family tradition.

Therefore, behind the production of *oja*, all the contemporary scientific principles applicable in the manufacture of western woodwind instruments are also applied, but the application is done intuitively. The application of scientific principles are in the area of construction of *oja* and sound production. Construction involves observation, calculation and measurement; while sound production involves the physical action of blowing air into the flute, which is responsible for the quality of sound produced. As Okafor (1994) observes: 'The unknown instrument makers have centuries ago discovered what research finds out today and passed on the skill as a living tradition. It is often held that theirs were mainly intuitive discoveries not backed by systematic theory and experimentation'. pp.167-186.

## GENERAL DESCRIPTION OF OJA

What exists today as *oja* is a product of wood technology based on the discovery by the Igbo through oral tradition and advanced by traditional craftsmen. The Igbo word, *oja*, refers to an end-blown wooden aerophone. As in the diagram





The above diagram shows a three-in-one or tripartite flute carved from one piece of wood. The blowing end (A) is like an oval or egg shape whose base has been truncated to merge into the top of a small bowl shape (B). A convex piece is carved from the top of the oval side to form a mouthpiece. The third carving (C) is the longest part of the *oja* and presents the hand holds of the instrument. A hole is drilled vertically from the mouthpiece through the whole length to the base of the instrument to form the bore. The side view shows that a hole is drilled through the middle (B) horizontally from right to left to form the side holes.

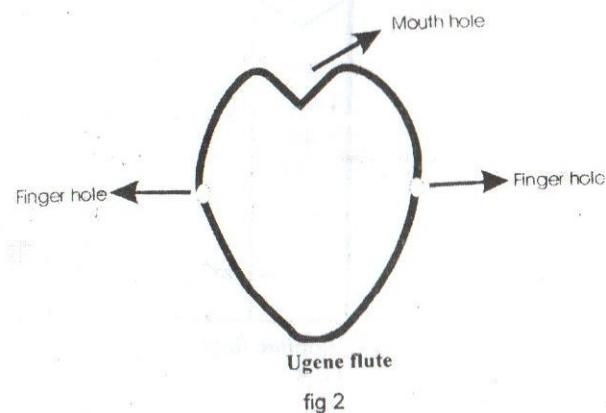
The normal *oja* ranges from between 15 centimeters to 20 centimeters in length and measures about 4 centimeters horizontally. The bottom and side orifices or holes are used to activate the air columns to produce musical sounds or tones.

### THE EVOLUTION OF OJA

The origin of *oja* is very obscure compared to other Igbo musical instruments. Legends and myths of its origin abound, although there are no written records. It is common knowledge that the source of information surrounding the origin of most cultural musical instruments in both Europe and Africa are often vague. According to Robert Austin in Encyclopedia Britannica. (2009)

*Legends and written records reveal other facts... the study of what information is available reveals many facts and allows much plausible speculations when facts are obscure.*

According to Igbo oral tradition, *oja* originated from the use of *ugene* seed, botanical name-*Nepoliene impleialis/vogelli-lecythidaceai*, which grows from a shrub in the bush. *Ugene* seed is hard and oval in shape. Whenever the seed is ripe, it falls from the shrub and the fleshy part gradually decays and wears off. As it dried up, the hard seed emerged with hollow interior (natural bore) as in figure 2 below. This condition made it easy to open holes at the top part and at the sides of the seed. The opening at the top enables blowing of air into the instrument, while the side holes are covered and uncovered by the thumb and the first finger. *Ugene*- the fore runner of *oja* was said to be played with one hand as only one finger hole and the thumb hole were required.



The inquisitive nature of man to manipulate and explore his environment is a necessity to invention and contemporary discoveries. The bamboo was later discovered to be more suitable for making the flute than *ugene*. The bamboo is oblong by nature,



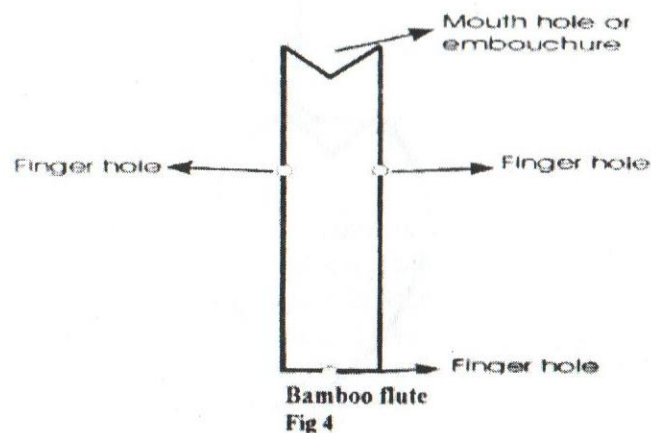
having different segments with natural bore. Due to the segments of different lengths and diameter naturally partitioned on the bamboo as in figure(3), it became possible therefore to produce flutes of different sizes with variations in pitch and tone quality (timber). The discovery of the bamboo flute was initially thought to be the climax of *oja* technology. This period was in fact, considered in Igbo culture as the golden period of the instrument.

In commemoration of the golden period the Igbo culture, East of the Niger, adopted the bamboo flute as the only melodic instrument used in royal music-*Igba-eze* of Igbo land-a position maintained till today.

The Igbo indigenous technologists did not stop at the bamboo stage, but continued to search for better wood material. It was later discovered that the *oja* made of bamboo flute is not sharp and does not seem to penetrate the spiritual realms when action is demanded under certain situations like in masquerade activities. Besides, the bamboo with its natural bore does not allow



**Bamboo**  
**Fig 3**



the technologist to open the inner circumference of the flute exactly according to his wish. In addition, the bamboo is very much affected adversely by the harmattan. As *oja*

playing became more popular due to the demanding roles it plays in the cultural life of the people, its improvement became inevitable. There was need to produce different forms of *oja* for different cultural demands.

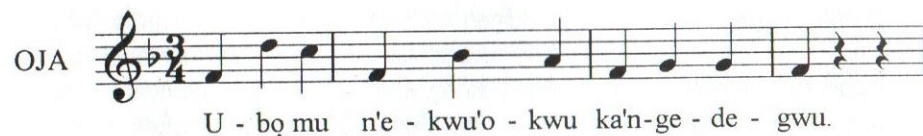
More technological advances to achieve better sound production led to a new discovery that some hard woods would not only last longer than bamboo by surviving adverse weather conditions, but produce more sonorous and piercing sound effects. Such wood as *okwe* (*Ricinodendron hondelotii*-Euphorbiaceae), *lcheku* (*Dialium guineense-caesalpiniaceae*) and *Akanta* (*Voacanga Africana-apocynaceae*) were used by the Igbo of Anambra State from where *oja* production and performance spread to other areas in the hinter-land of the Niger such as Imo, Abia, Enugu and Ebonyi states, that practice the *oja* technology. Today, *Akanta* has taken the lead among the woods used for the production of *oja* in Igbo culture.

### THE MAKING OF OJA

The technology surrounding the making of *oja* is very complex. The required *Akanta* wood and the size of *oja* to be produced are considered first and foremost before the *oja* maker goes to the bush to cut the wood to the required sizes. He takes the pieces of wood home and leaves them in a dry environment where they are expected to season for a period of about three months or more, depending on the atmospheric condition. After the pieces of wood have been well seasoned, the technologist takes them to his workshop where he uses fire to heat up different sizes of long iron nails to red heat. He then uses the red-hot nails to create the required holes on the *oja*. The upper hole, which is the mouth hole, is the widest of all. As he works on the *oja*, he pauses to play and listen to the sounds.

The technology employed in Igbo flute making requires much craftsmanship. It is important to note that a novice in the art of flute playing cannot be a good flute maker, because of the musical tones which he must play and listen to from time to time as he works on the instrument. The musical notes are based on a melodic sentence in oral tradition, which the flute maker constantly has in his mind-as below:

Example1:



My piano talks like my xylophone



With this melodic sentence, it is clear that *oja* has six tones in the scale as below:  
Example 2:

## THE SCALE OF OJA



As soon as the tones are found, the next stage in the construction is decoration, which might be done another day. This decoration is deferred because it is an aspect that requires a different artistic approach that is symbolic or meaningful to the culture.

### SCHOLARLY CONTRIBUTIONS

Onyeji in his contribution to Igbo ethnomusicology observes what he calls, *frustrating problems associated with the study and performance of the oja in whatever context*. In his quest for the realization of a standard guide for the instrument. Onyeji was confronted by problems of different pitches in different *oja*, owing to what Onyeji refers to as *the present crude nature of the instrument with its unscientific measurement and construction*.

This opinion is open to contention on many grounds. For Onyeji to propose a fingering guide to enable one compose for the instrument in contemporary conventional notation is not possible. The fact remains that *oja* is not tempered like the western flutes. This is because it is a tonal musical instrument designed by indigenous technologists to follow the tonal patterns of Igbo language, yet it is quite common to get two or more *oja* flutes that can comfortably play in a duet or trio, provided the flutes are manufactured by the same instrument maker. This is the case with *Igba ljele* ensemble where two *oja* flutes play in a duet. Indigenous technology has taken care of the problem as individual *oja* makers have specialized and standardized their construction, such that two or more *oja* flutes from the same source would sound the same way in regular pitches.

This researcher further differs with the opinion of Onyeji who believes that *oja* is crude and unscientific. The fact that indigenous technology in African is not documented does not mean that what Africans do is not scientific. My physics teacher taught me that, the theory by Aristotle that, the length of a string, when stretched, varies inversely with the pitch of sound vibration produced by the string. This is the principle behind the construction of the musical bow *goge* or *une*. As Okafor (1991) intimates, and further observes that *goge* is a violin, the *Kubura* is a double bass while *algaita* are oboes. These are facts that prove that those African instruments are founded on the same

principle with the western musical instruments.

Generally, I agree with Onyeji that organological improvement in the construction of local flutes is necessary for both indigenous and modern technology, especially with regards to improvement in sound quality, and increase in available number of tones in *oja*. As Okafor (2005) observes. 'The unknown instrument makers have centuries ago discovered what researchers find out today and passed on the skill as a living tradition. It is often held that theirs were mainly intuitive discoveries not backed by systematic theory and experimentation'.

Based on his observation, this researcher is of the opinion that the agitation of the air column in an open or closed pipe like *oja* is the principle behind the construction and operation of most aerophones, and this involves the velocity of air inside a pipe, the length of the pipe, the wave length of air and the fundamental frequency which determines the pitch of the sound produced.

To some extent on the one hand, the researcher agrees with Onyeji that organological improvements in the construction of local flutes is necessary for both indigenous and modern technology, improve the sound quality and to increase available number of tones. On the other hand, the researcher fears that such improvement in *oja* will affect the cultural tone (timbre) of *oja*, transforming it to a foreign instrument that will sound foreign to the culture.

### COMMENTARIES ON THE FULA FLUTE

Available literature, (from the internet) has also contributed towards the possible way forward for the Igbo flute to go beyond its cultural boundary. From an interesting review, the *fula flute ensemble* from New York, many inspiring revelations have been gathered about the wonderful achievements of this local flute (*tambin*) from Guinea in Africa, just a three-hole flute like *oja*. After a successful launch of the *fula flute sextet* in New York in the year 1989 by a Guinean born-Bailo Bar, the flute has gone international and is globally recognized as a standard instrument which a musician can study as a vocation. On this African flute, Banning Eyres (2009) comments:

*If you think of flute music as gentle and dulcet, you haven't heard the howling and growling of the Fula flute, most typical of Fauta Djalon in Guinea. The over-blown flute that thrilled rock fans in the music of Jethro Tull back in the 70s seems the same when compared with the exhilarating playful theatrics of New York based flautist Bailo Bah.*

Ruth Sanders (2009) of Root Magazine England comments:

*Forget Mozart and Freemasons, Fula flute is the real Magic flute, absolutely*



trancelike, hypnotic... Twin players of the Fula flute or tambin are Bailo Bah, half Vietnamese, half Guinean and Sylvi Loroux... They play traditional songs.

The above comments are just among many that have been written in papers and magazines from different parts of the world about a single three-hole African flute called Fula flute, with *tambin* as its cultural name.

### COMPARISON OF FULA FLUTE WITH OJA

This review from the internet attracted the attention and interest of this researcher who is also a flautist of *oja*. In his study, he discovered that the fula flute is a local flute just like *oja*. Both flutes have three holes that are manipulated by the fingers to produce tones, and the tones follow the speech tones of the language of their respective cultures—an indication that they are surrogates. From findings surrounding them, these two cultural flutes (*tambin* and *oja*) have very identical features.

### POTENTIALITIES AND THE FUTURE OF OJA

Historical evidence shows that many of the musical instruments that are popular in the world had their humble beginnings. They were intuitively or accidentally discovered and gradually developed to a higher standard for the greater appreciation of man.

*Oja* as an important musical instrument in Igbo culture has a very humble beginning, from the seed of a fruit called *ugene* to bamboo and finally to wood, passing through different stages of developmental improvements. The western European concert flute originated from bamboo and metal pipe through the same process. The fula flute from bamboo used by the cattle Fulani of Guinea with little developmental stages to the sophisticated level that it has attained today also passed through the same process. Other world cultures have their musical instruments discovered and developed in the same way.

The *oja* in a hundred years time might be something wonderful in the world of music. Technological improvements can add more tones to it, making it more sophisticated and appreciated in the global music scene. Philip Imeagwali is an Igbo man who designed the best and fastest computer in the world. In the same way, an Igbo man can bring up *oja* as the best in the aerophone family of musical instruments. If computer is applied to the design and production of *oja*, which is a possibility, then it is possible to have more refined pitch and tone and who knows, the present *oja* with a maximum of six tones may be refined and expanded to carry more tones up to twelve, and still maintain its cultural flavour. As we have flutes made of metal and plastic, we can develop *oja* made of metal, plastic, ceramics, glass, silver and gold which can easily beat the adverse weather condition which in the past had challenged the *oja* craftsmen

to go in search of better wood materials for *oja* making. *Oja* could have different classes and range of tones such as treble, alto, tenor and bass *oja* flutes, making it possible to play in such ensembles as trio, quartet, sextet, quintet, octet, concerto and symphony.

### SUMMARY AND CONCLUSION

*Oja* is a popular musical instrument of the Igbo of Nigeria. It is a three hole flute and a member of the aerophone family of musical instruments as classified by Sachs and Hornbustel in 1933. It is a product of Igbo indigenous technology developed and sustained by traditional craftsmanship, but this researcher considers it unfortunate that some people, including scholars look at *oja* as crude and unscientific despite all the scientific principles applicable in its technology and sound production-features that reveal the fact that music is both an art and a science.

Evidences show that the same scientific principles are applicable in other aerophones like the fula flute of Geauea—a three hole flute (like *oja*) which has gone international and now recognized in the global musical art. Technological improvements might in the near future make *oja* to be something wonderful in the world of music, making it more sophisticated and appreciated in the global music scene.

### REFERENCES

- Agu, D.C.C. (1990). Traditional African Music Contributions to Contemporary Music Creation and Performance Technique. *Humanity and all of us*. Onitsha: Watchword.
- Blacking, J. (1976). *How Musical is Man?* (2<sup>nd</sup> ed.). London: Faber and Faber.
- Chukwu, S. (2007). 'Igbo Musical Instruments: A Taxonomical Study on the Classification of Traditional Instruments of Imo state, Nigeria'. An unpublished PhD dissertation, Nnamdi Azikiwe University, Awka.
- (2007). 'Language Structure and Cognitive Principles in Igbo folk Terminologies for the Naming and Classification of Traditional Musical Instruments: An Ethnomusicological perspective'. Unpublished PhD seminar. Nnamdi Azikiwe University, Awka.
- Emeka, L. (1988). 'Music in a Technological Era: The Nigerian Experience'. In J. E. Nnadi (ed.). *The Humanities in Contemporary Nigerian Education* (133-145). Enugu. Ihumefu College of Education.



- \_\_\_\_\_. (1991). 'The Bedfellows: The Nigerian Culture: A Challenge to Western Technology'. In R.C. Okafor (ed.). *Elements of Science and Technology in Indigenous Nigerian Culture*. (153-164). Enugu: Centre for Science, Technology and Culture.
- James, M. (1988). *European and American Wind and Percussion Instruments: Catalogue of the Stearus Collection of Musical Instruments*. USA: University of Michigan.
- Nelcon, M. & Parker, P. (1977). *Advanced Level Physics*. Onitsha: African Feb.
- Okafor, R.C. (1991). Musical Engineering in Nigeria-Manipulating the Environment. In R.C. Okafor & L. Emeka (Eds.), *Element of Science and Technology in Indigenous Nigerian Culture*. (166-195). Enugu: Centre for Science, Technology and Culture, Anambra State University of Technology.
- Okafor, R.C. (2005). *Music in a Technological University*. The 14<sup>th</sup> Inaugural Lecture at the Enugu State University of Science and Technology. Enugu. 27<sup>th</sup> September.
- Onyeji, C. (1997). 'The Playing Technique and Contemporary Composition for Oja (wooden flute)'. In B. Omojola (ed.). *Music and Social Dynamics in Nigeria* (51-56). Ilorin: Department of Performing arts, University of Ilorin.
- \_\_\_\_\_. (2007). 'An Introduction to the Technology of Oja (Igbo Wooden Flute)'. In E. Ochle (ed.). *Talking Drum* (96-205). Newsletter Issue of 28<sup>th</sup> December. Pan African Society for Musical Arts' Education (PASMAE).
- Philip, B. (1979). *The flute: A study of its history, development and construction*. (2nd ed.). London: Macmillan.
- Poh, L.Y., Anyoku, M.N. & Okeke, P.N. (2002). *University Physics*. Onitsha: Africa Feb.
- Sachs, C. (1933). *Classification of Musical Instruments*. (Translation) Anthony Baines and Klaus Washman. *Galpin Society Journal*, No.14. 3-29.
- Theobald, B. (1964). *The Flute and Flute playing in Acoustical Technical and Artistic Aspects*. (2<sup>nd</sup> ed.). London: Macmillan.

## INTERNET SOURCES

- Austine, R. (2010). Woodwind instruments and their history. Available @ <http://www.Britanica.com/Ebecheked/Topic/645041/Windinstrument/538021/m-Western,Europe>. Accessed, 14<sup>th</sup> August 2010.
- Brief History of the Flute (2009). Available @ <http://www.associatedcontext.com/Article/45337019/Briefhistoryoftheflute>. Accessed 14<sup>th</sup> August 2010].
- Curtney, D. (2009). The Bamboo Flute. Available @ <http://enhandrakantta.com/article/Indian.mus/bason:htm/oytinstr.htm:2009> Accessed: 15<sup>th</sup> August, 2010
- The Fula flute ensemble. (2009). Available @ [www.mriedrosedovyon.com](http://www.mriedrosedovyon.com). 2009 Accessed: 15<sup>th</sup> August 2010].

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