DISSECTING THE CORRELATION BETWEEN LINGUISTICS, BIOLOGY AND INFORMATION TECHNOLOGY

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Abstract
The existential correlation between linguistics, biology and information technology is seldom considered by many. This study rises to concisely dissect the correlation between these fields. It reveals that linguistics correlate biology and information technology. It also shows that information, science and methodological naturalism correlate linguistics, biology and information technology. These realities are given credence by theoretical postulations of the Theory of Systemic Functional Linguistics and the Theory of Structural Functionalism. From the analysis and through the lens of these theories, the study concludes that linguistics, biology and information technology correlate and demonstrate connective functionality that has existential or natural bearing. The study recommends consistent exposition of these realities to the layman by linguists.

Introduction

To study the biology of language, much more than the current knowledge of biology is needed. Biolinguistics is that special type of linguistics needed to go beyond the current biology (Sin categoría, 2018). Information technology is also needed for various uses and purposes for both biological and linguistic studies. These three phenomena and disciples largely share more of covert than overt features. Thus, many people seem to be ignorant of the reality that there is existential correlation between them. These three fields, among others, are interdependent. The connectivity among them has functional bearing, a bearing to structural functionality of integral parts of a whole society system. In education, for instance, these three are separate entities, systems or phenomena that yet correlate and function interdependently for the good of all in the one whole system of education.

Given the above, this study rises to dissect the correlation between linguistics, biology and information technology. In the course of dissecting the correlation, the study shall descriptively situate linguistics in both biology and information technology, as the base of the correlation. In other words, it shall show linguistics as joiner of the two, biology and information technology on one hand and how linguistics itself correlates with each of the two fields. The correlation between them shall be dissected descriptively, highlighting the base of their correlation.

Aim and Objectives

The aim of this study is to dissect the correlation between linguistics, biology and information technology. The objectives are to:

(i) Show how linguistics, biology and information technology correlate.

(ii) Describe the correlation between linguistics, biology and information technology correlate.

(iii) Situate linguistics in both biology and information technology, as the base of the correlation.

Research Questions

The following research questions guide this study:

(i) How do linguistics, biology and information technology correlate?

(ii) What is the correlation between linguistics, biology and information technology?

(iii) Where does linguistics situate in biology and information technology, as the base of the correlation?

Concept and Scope of Linguistics

Linguistics is generally defined simply as the scientific study of language (Deutschmann, Steinvall and Lindvall-Östling, 2020; Besong & Robert, 2018; Robert, 2018; Dibie and Robert, 2014; Monday & Eze, 2012; Nwala, 2008; Emeka-Nwobia, 2007). It is said that the various definitions of linguistics given by different persons all point to the common viewpoint that linguistics is that field which studies language scientifically, analysing different levels of language (Robert, 2018; Nwala, 2008). Linguistics is a science, even though its scientific status is contested. For some persons, it is not a science; for another set of persons, linguistics is a social science, but not a pure science; for others, linguistics is both a pure science and an art.

Linguistics studies the phenomenon of language. As a science, linguistics is known with the scientific methods of data collection, observation, test, experimentation, hypothesis, generation or formulation of linguistic principles or laws (theories), valid results (facts) (Ndimele, 1997; Agbedo, 2000; Anagbogu, Mbah & Eme, 2001; Emeka-Nwobia, 2007; Nwala, 2008; Dibie & Robert, 2014 & 2016; Besong & Robert, 2018). The linguist is the scientist concerned with the phenomenon of language in its entirety. As Dibie and Robert (2014 & 2016) and Besong and Robert (2018) observe, the placement of linguistics in the Faculties of Arts and Humanities, Education and Social Science does not negate its scientific status. This is because linguistics, like other fields in the pure, natural, applied, social, and management sciences, usually employs scientific methods in studying language, its subject matter.

Linguistics is the field that undertakes all that concerns language, including informatics, language engineering and speech pathology. Linguistics also engages in sustained engagement in practical and laboratory activities, speech and language disorders, language/speech therapy, clinical services in the field of clinical linguistics, computing and communication, forensic science, etc. Some of these sub-disciplines are also shared by or found in biology and information technology. Among them are clinical linguistics, forensic science, speech defects and pathology, laboratory activities, informatics, communication science, etc.

Concept and Scope of Biology

Etymologically, biology is derived from two Greek words ‘bio’ and ‘logos’, whereby ‘bio’ means life, while ‘logos’ means study. It is the study of life and organisms. Living organisms are plants, animals and microorganisms. These organisms are studied along with their biological processes, functions and importance to the environment. Biology is also regarded as life science or biological sciences. Pierre-

Antoine de Monet and Jean-Baptiste de Lamarck coined the term biology in the late 1700's. Initially, biology concerned Botany and Zoology in the pure science. With new technologies, biology now extends to applied sciences that include the comprehensive study of living and non-living organisms, physical characteristics and behaviours of living organisms, living cells, chemical substances, ecosystems, environment (nature), environmental changes and challenges, reproductive system, human brain, and the composition of our genes, among others.

Again, biology is a scientific field that focuses on the study of living things, including plants, animals, and microorganisms, as well as their biological activities and the impact they have on the environment. It is also known as the study of all living things and how they interact with their surroundings. By uncovering the mysteries of living organisms by carrying out research, Biology is a study of life and living beings, be it humans, animals or plant communities. The scope of biology is very broad. It includes all aspects of life ranging from the molecular stage to internal structures and organisation of the living organisms.

Biology is a science. Science includes such diverse fields, such as astronomy, biology, computer sciences, geology, logic, physics, chemistry, and mathematics. Biology or biological sciences include environmental studies, forensic science, microbiology, pharmacy, biotechnology, veterinary medicine, medicine and surgery, nursing, dietetics and food science, nutrition, biochemistry, genetics studies and engineering, biological technology. Some others are biomedical sciences, life sciences, molecular biology, cryobiology, astrobiology, ornithology, parasitology, socio-biology, neurobiology, clinical chemistry, histology, bacteriology, zoology, biomedical engineering, and neuroinformatics, to mention but a few.

Concept and Scope of Biolinguistics

According to Sin categoría (2018), biolinguistics is not a mixture of biology and linguistics or an application of biology to the study of language. Rather, it is the name given to that area of linguistics that that forms a part of natural science. In other words, biolinguistics belongs to the discipline that studies human languages from the viewpoint of natural science. By implication, biolinguistics is an abstract layer of the biology of language, a decisive step for the integration of the study of language in natural science. The emergence of the nervous system, of the brain, of the human brain, and of the language faculty added huge amounts of additional special information to feed into the fundamental equations of physics, and caused the subsequent emergence of disciplines that address these areas of complexity (neurobiology, psychology, linguistics, and other cognitive sciences).

As Gell-Mann suggests, "the enterprise of science involves investigating those laws at all levels, while also working, from the top down and from the bottom up, to build staircases between them" (Gell-Mann, 1994, p. 112). Biolinguistics has both missions: investigating the "additional information" of language structure and, at the same time, contributing to the building of staircases in search of unification and principled explanation. The two main qualities that characterise biolinguistics as a science in relation to other types of linguistics are methodological naturalism and internalism. The expression methodological naturalism simply implies that biolinguistics is a kind of linguistics that uses the same methodology used by the natural sciences. McGilvray (2013, p. 46) suggests that biolinguistics ought to be called 'bio-chemico-physico-compulinguistics'.

Nevertheless, it is still appropriate to call it biolinguistics because Chomskyan linguistics postulates that language, the object of inquiry, is a natural cum biological object. Thus, biolinguistics is not just a natural

science only on the basis of using same methodology as the natural sciences do. It is because language is a natural cum biological object. Whatever is associated with methodological naturalism is natural and biological; being what has biological foundations (Sin categoría, 2018).

As Chomsky (2000 & 2002) has argued repeatedly, language is a mental organ; the 'mental' is a part of the 'real', just like the 'electrical' or 'chemical', so that language is just another natural object. Chomsky's intellectual commitment is to methodological naturalism (i.e., 'the mental' and 'the physical' must be dealt with using natural science) rather than ontological naturalism (i.e., 'the mental' is part of 'the physical'). In his words, "Unless offered some new notion of 'body' or 'material' or 'physical', we have no concept of naturalism apart from methodological naturalism" (Chomsky, 2000, p. 143).

According to Sin categoría (2018), it seems quite clear that the split between the sciences and the humanities is a manifestation of methodological dualism. However, not every instance of methodological dualism is also an instance of ontological dualism. Many people think that issues bordering on language, consciousness, ethics or feelings belong not to the realm of the natural sciences rather than to realm of human sciences. Nevertheless, even in the domain of modern cognitive science, it is not strange to discover that ontological naturalism, which almost everyone supports, gives rise to methodological dualism and not to methodological naturalism, as expected (Sin categoría, 2018). One major reason for the foregoing is 'the inherent difficulty of the logical path from ontological naturalism to methodological naturalism' (Sin categoría, 2018).

Concept and Scope of Information Technology

Information technology (IT) describes information production, storage, processing, usage, analysis, dissemination and consumption, which involve the use of technologies like computers, computerised devices, the internet, etc., which together form the new media. It is also regarded as information and communication technology (ICT). Technology refers to either a technology-based medium or media of communication (Lievrouw & Livingstone, 2002). McLuhan (1964) has argued that technology (medium) is more valuable to the society than the content of the message. The content of the message is the information. Communication is the exchange of information, feelings, etc. between a speaker and a listener (Ndimele, 1999).

Information is on the high demand, as it is realised that 'the growing complexities of present day society and the increasing demands for information, referral services, a new dimension' (Haruna & Oyelekan, 2010, p. 16). The importance of information is expressed by Zwangobani (1987), who is of the view that information represents power in both economic and political fields. According to Anjugu (2013), technology includes the blogs, picture sharing, music sharing, crowd sourcing, e-mail, instant messaging, and voice record. All these components of technology obtain on social networking sites (SNSs). Among these social networking sites, social media are most predominant ones (Anjugu, 2013, p. 28). Boateng and Amankwaa (2016) define social media as a vast collection of internet-based and mobile services, whereby heterogeneous users connect from different distant places to interact, communicate, discuss and exchange ideas, thoughts, feelings, information, knowledge, etc. on an online community. As Edogor (2012) rightly notes, social media are used by students for chatting, relating with friends, downloading music and sending online comments on various issues.

Social networking sites (SNSs), including social media, make up the new media. SNSs have significantly transformed the ways people think, act and do things socially, politically, educationally and otherwise. New media have their peculiar technologies quite different from those of the old or traditional media. The technologies of the new media include internet, multi-media, portals, mobile phones, gaming, animations, multi-media, portals, etc. (Ravi, 2012). According to Ravi (2012, p. 480), these technologies have millions of users in over 200 countries, and have greatly impacted on communication, creativity, cognition, education and culture. The users include linguists, biologists and technologists of various fields of life, among others. The usage highlights the relevance of information technology in linguistics, biology and other human endeavours.

Just as scholars confirm that IT is of great benefits to various (or even all) fields (Ta, 2014; Bonsu et al., 2013; Mansell, 2004; Davis, 1987), this study argues that Information Technology (IT) is equally of great benefits to linguistics and biology. It has succeeded in transforming, expanding, innovating, and repositioning these fields. Its impact on life, language and professionalism are some benefits (Temur, 2020; Eze & Ogbaga, 2019; Coleman et al., 2016; Aktaruzzaman, Shamim & Clement, 2011; Keengwe, Onchwari & Wachira, 2008). IT has made teaching and learning better, flexible, easy, innovative, more critical, creative and productive, research oriented, and driven by audio-visual electronic devices (Temur, 2020; Eze & Ogbaga, 2019; Aktaruzzaman, Shamim & Clement, 2011). According to Keengwe, Onchwari and Wachira (2008), the application of multi-media technologies in teaching and learning guarantees a very productive, interesting, motivating, interactive and quality delivery of classroom instruction, while at the same time addressing the diverse learners' needs. Multi-media technologies include those technology-based devices that combine text, graphics, video, animation and audio.

Theoretical Framework

This paper is anchored on Michael A.K. Halliday's (1978; 1985; 1994) Theory of Systemic Functional Linguistics (TSFL) and the Theory of Structural Functionalism (TSF). Accordingly, Halliday theorises that language is a social semiotic that offers its users a network of choices to create both spoken and written texts (Halliday, 1985; 1994). Teo (2000, p. 24) rightly observes that the meaning of spoken or written texts (messages) is dependent on the choices made by users, especially speakers and writers. It follows that TSFL considers language as a resource for a meaningful industrial dialogue between two and/or more parties.

Halliday is of the opinion that language is only functional when used appropriately to carry out a whole lot of beneficial or positive activities. The activities include those of linguistics, biology and information technology. In the words of Halliday (1985, p. 1), "It seemed to me that explanations of linguistic phenomena needed to be sought in relationships among systems rather than among structures – in what I once called 'deep paradigms' – since these were essentially where speakers made their choices." It should be noted that linguistics, biology and information technology are all phenomena. And, there are functional relationships among these fields as systemic, intellectual, practising and societal structures. From Halliday's words above, it should be noted that systemic functionality in linguistics has an operational correlation with biology and information technology.

Analogically, various concepts in biology and information technology are linguistic concepts. Linguistics situates in both biology and information technology. Without linguistics, concepts in biology and information technology would not be created. Terminologies of both biology and information technology are linguistic concepts given phenomenal dimensions in practical contexts. Right from their morphological

creation to their pragmatic usage and realities, there is an existential functional connectivity between and among them.

Essentially, there is an existential functional connectivity between linguistics and these other two fields, biology and information technology. That calls to mind the structural functionality of the sociological structural functionalism. We shall turn to TSF soon afterwards. Both biology and information technology rely on language for functionality. Language is what makes them operational and functional. Language is the corpus of linguistics. Language connects all human endeavours. Knowledge of and information about biology, information technology and other fields are made known through language. Linguistics is the ultimate among the three fields looked at here because it is the field that concerns itself with language, the medium for communicating biological and information technology knowledge and activities.

Meta-functions are notion and practice that characterise TSFL. Meta-functions are field, tenor and mode. Accordingly, tenor refers to the socially defined relations between the parties involved in an interaction (Halliday, 1978, 1985 & 1994). Field refers to the subject matter of the text. Mode is the medium and role of language in the situation (David, 2002; Halliday, 1994). It follows that language use involves two or more parties in communication. These parties initiate, use and end up communication process. Next, there must be a subject matter in every discursive interaction of the parties engaged in communication (Halliday, 1985 & 1994; Teo, 2000; David, 2002). In addition, language must be used for communication. That is to say there can be no communication without language (Teo, 2000; Austin, 1962). Also, it implies that there is a functional connectivity between linguistics and other fields of human endeavours, such as biology and information technology.

Having stated the above, we now turn to the Theory of Structural Functionalism (TSF), also known simply as Functionalist Theory (FT). STF is founded by Emile Durkheim and Robert Merton. These are the earliest pioneers of the functionalist theory, who were sociologist. Functionalism, according to Brown (1952), is a condition in which all parts of the social systems work together in a sufficient degree of harmony or internal consistency, devoid of persistent conflicts that can neither be resolved or regulated. To Cancian (1960), functionalism is a system that can be analysed into a set of interdependent parts, the value of some of which determine whether or not a certain property will occur in the system, and there are certain limits on the variations of the values of the variables and the system would thereby disappear. These two definitions, which are considered to suffice for others, highlight the overall notion of functionalism. The most important message drawn from the definitions is that systems correlate and function in correlation with one another. Thus, it supports the standpoint of this study that linguistics, biology and information technology correlate.

For the functionalists, elements of society are functional and interconnected. Basically, functionalist theorists hold that society is a collection of integral the parts of a whole, which must co-exist, correlate, and be interdependent and functional in their dealings, so as to pursue and realise substantial established goals that are of the good of all (Merton, 1938; Chinoy, 1967; Ashley, 2019). For the functionalists, the functionality and the stability of society depends on the collective contributions of all its constituent elements (Ashley, 2019, pp. 1-2). Elements of society are functional if they contribute to social stability and dysfunctional if they disrupt social stability. Some aspects of society can be both functional and dysfunctional. There are manifest and latent functions. Manifest functions are consequences that are intended and commonly recognised; while latent functions are consequences that are unintended and often hidden (Ashley, 2019, pp. 1-2).

Structural functionalism aptly explains the inter-connectivity between among linguistics, biology and information technology. Undoubtedly, there is a systemic, structural and functional correlation between and among them. The connectivity is such that when one fails to function, the others in the chain or hierarchy get affected and thereby fail too. The constituents of the chain of structural functionality are more like the parts of the body. If one part is disfigured, the other parts are also affected (Ashley, 2019, p. 1), despite still functioning without the disfigured one(s). Therefore, for maximal functional society, these three human endeavours (fields) correlate with one another. They are interdependent and rely on one another in different regards. It is in view of the foregoing that Biolinguisitcs exits and operates. That is also why there are courses like Linguistics and Information Technology, and Linguistics and Computer Mediated Communication in the tertiary education system of the contemporary society.

Correlation between Linguistics, Biology and Information Technology

Linguistics, biology and information technology correlate on the basis of language, science and information. That is, language, science and information are the core phenomena that correlate these three fields. While there are other factors, this paper focuses on these three phenomena as the base of the correlation between linguistics, biology and information technology. Language lies behind the fields. Without it, there can be nothing meaningful about them as well as all other spheres of life. Linguistics, not biology, information technology, physics, chemistry, or any other field of the natural sciences, can sufficiently explain mind and language. For example, they cannot explain, describe or predict the structure and meaning of a passive sentence. Linguistics alone can do so among them (the aforementioned and many other natural sciences). This reality tells us why linguistics is the base of the correlation between biology and information technology. Thus, linguistics situates in both biology and information technology.

Again, it is difficult to understand simple affirmative transitive sentences in strictly neurological terms. If passive sentences, phonemes, morphemes or constraints on constituent movement are not physical, chemical or biological objects, then they are either irrelevant or belong to the realm of other non-natural, purely descriptive sciences. It is affirmed that many biologists, physicists, chemists and linguists believe that Chomsky's methodological naturalism implies that if any theory of language structure is empirically adequate, then that theory is already part of the body of scientific, naturalistic research on language. This stance makes sense if we recognise that we cannot prejudge what kind of physical reality language will have, and if we limit ourselves to studying it like just another natural object. This implies that the discipline at hand, although it does not work with bosons, isotopes or proteins, is a natural science. Biolinguistics is, then, a branch of this 'natural linguistics'. In contrast, the thought that biolinguistics is part of natural science is repeatedly rejected by biologists or physicists but also by linguists and philosophers. The commonest reason for the rejection is the fact that those who reject this notion do not conceive language as a natural phenomenon.

Science is the field that ultimately binds these three disciplines: linguistics, biology and information technology. Science, derived from Latin scientia, means 'knowledge', can be defined as knowledge, a very specific way of learning or knowing about the natural world. Science is said to be largely responsible for the technological revolutions that characterise the contemporary era. It is affirmed that there are areas of knowledge and human experience that scientific methods cannot be applied to. These include answering purely moral or spiritual questions, ethical questions, and aesthetic questions. Science cannot investigate these areas because they are outside the realm of material phenomena, the phenomena of matter and energy,

and cannot be observed and measured. This reality tells of how and the extent to which linguistics stands above biology and information technology in terms of the nature and correlation.

There are two main approaches to science. These are the empiricist and the rationalist approaches or conceptions. According to the empiricist view, the goal of science is to discover the causes and nature of things. On the other hand, the rationalists are of the view that the aim of science is to translate nature into the language of mathematics. There is a popular belief that the task of science is not to find concepts or representations of the entities that compose reality but to construct mental realities (concepts and theories) and try to determine through experiments which ones find support in what we perceive. Biolinguistics does same or is not different in its consideration of how to construct formal models and theories that make the object of inquiry intelligible (Sin categoría, 2018).

Again, linguistics, biology and information technology are characterised by observation, tests, experiments, hypotheses, and formulation of principles and laws. Linguistics and biology are of pure science (Agbedo, 2000; Nwala, 2008; Dibie & Robert, 2014). By implication, these three fields are scientific. They are both foundational science disciplines. Then, linguistics was philology (Agbedo, 2000; Nwala, 2008). It evolved in the same era with biology. Information technology is of both applied and pure sciences. Information science is of natural or pure science. Technology is of applied and natural sciences. It is observed that the extent to which science can go in all it does and can do depends largely on language (Dibie & Robert, 2014; Uche, 1994). Here, this paper argues that the extent to which biology and information technology go depends on language, the corpus of linguistics. The place of language in all endeavours, including sciences, has been echoed by Uche (1994, p. 101) viz: 'Without language, science cannot strive; this shows that effective communication in science involves [the] ability to use and understand the technical terms as well as interpret information encoded in symbolic form into another non-symbolic form of language.' Thus, for science to strive or even get its dealings carried out and revealed to society, it must fall back to linguistics.

Teaching biology involves providing information about the latest developments in the field of biological sciences all over the world. Information correlates with linguistics, biology and information technology. The three fields, like every other field, involve, need and rely on information. With the innovation in the information sector in contemporary time, information technology is the base of information, which is needed and used in all fields. It is with technology that information about biology, linguistics, communication, science, etc. is spread, taught, learnt, transmitted and sustained across generations. More so, these fields correlate by virtue of their subject matters. These are language, life and information, which are all phenomenal, natural, biological, practical (empirical) and conceptual.

Language is to linguistics. Life is to biology. And, information is to information technology. Additional to information is technology in the field of information technology. Basically, linguistics takes the lead in all that concerns the language-based constructions of everything about biology and information technology. The other two cannot undertake such constructs about linguistics. However, they influence constructed linguistic property in their respective field to inherent and identical to each of them, as in the case of biology registers and jargons, information technology as well as new media language with its registers, jargons and other evolving linguistic features that are associated with it– information technology.

Conclusion

On the whole, this study has dissected the correlation between linguistics, biology and. information technology. It has shown how these three fields correlate. The correlation between them has been described concisely. Linguistics is proven to be the base of the correlation. As such, its place in biology and information technology is affirmed. On the whole, the peak of their correlation is evidenced in their connective functionality that has existential or natural bearing.

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