EXPLORING THE DESIGN AND DEVELOPMENT OF DIRECTIONAL SIGNS USING MEDICAL PICTOGRAMS AND BILINGUAL INSCRIPTIONS FOR AHMADU BELLO UNIVERSITY TEACHING HOSPITAL (ABUTH), SHIKA-ZARIA

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A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL AHMADU BELLO UNIVERSITY ZARIA, NIGERIA, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF ARTS DEGREE IN INDUSTRIAL DESIGN

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DECLARATION

I declare that the work in the thesis entitled "Exploring The Design and Development of Directional Signs Using Medical Pictograms and Bilingual Inscriptions for Ahmadu Bello University Teaching Hospital (ABUTH), Shika-Zaria" has been performed by me in the Department of Industrial Design under the supervision of Dr. S. U. Dakyes and Dr. J. I. Azi. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this thesis was previously presented for another degree or diploma at any university.

_____	_____	_____
Name of Student	Signature	Date

CERTIFICATION

This thesis entitled "EXPLORING THE DESIGN AND DEVELOPMENT OF DIRECTIONAL SIGNS USING MEDICAL PICTOGRAMS AND BILINGUAL INSCRIPTIONS FOR AHMADU BELLO UNIVERSITY TEACHING HOSPITAL (ABUTH), SHIKA-ZARIA" by Kange Raymond Kahnge meets the regulations governing the award of Master of Arts in Industrial Design of Ahmadu Bello University, and is approved for its contribution to knowledge.

Dr. S. U. Dakyes Chairman, Supervisory Committee	Date
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ABSTRACT

The purpose of this study was to investigate the state of the directional signs in Ahmadu Bello University Teaching Hospital, Zaria. The aim was to develop bilingual signs using English and Hausa languages and supporting pictorial symbols that would be capable of impacting visual meaning on the target audience – especially towards easing wayfinding challenges for patients, caregivers and visitors. A survey method was applied to examine subjects of the population. An interview was conducted to ascertain the development of the existing signs; questionnaires were also administered on clustered samples from which 50 responses were elicited. The results revealed that in spite of the fact that there are existing directional signs at Ahmadu Bello University Teaching Hospital Zaria, patients, caregivers and visitors were still confronted with navigational difficulties as they moved through various health service units of the hospital. Regardless of their literacy status, majority of those interviewed could recognize 90% of the visual symbols developed for this research. The conclusion was that a well-planned navigational or wayfinding sign system that incorporates standardized pictorial symbols, display fonts, and adhered to appropriate principles and elements of design would guarantee optimal directional needs in Ahmadu Bello University Teaching Hospital, Zaria. The study finally recommended that further research on bilingual sign design incorporating other language groups across Nigeria was highly desirable.

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Definition of Terms

Bilingual Sign: The representation on a panel (sign, usually traffic sign, safety sign and information sign) of text in more than one language.

Legibility: Is the ease of recognizing a character (for instance, is it a C or a G?).

Logograph: A single written symbol that represents an entire word or phrase without indicating its pronunciation.

Pictogram: A pictorial representation of an object; it combines the visual language of signs and pictures to communicate with the viewer.

Readability: Refers to how easy an extended amount of text is to read as well as how type (and the other design elements) is arranged on a page.

Semiotics: Also called semiotic studies or semiology, is the study of sign processes (semiosis), or signification and communication, signs and symbols.

Signage: Any kind of graphics created to display information to a particular audience, (typically wayfinding information) on streets, outside and inside of buildings.

Speleologist: One who is concerned in the exploration and study of caves; a student of speleology.

Wayfinding: A process whereby people and animals orient themselves in physical space and navigate from place to place.

X-height: The distance between the baseline of a line of type and the top of the main part of the lower-case letter-faces - apart from the ascenders and descenders.

CHAPTER ONE

1.0 Introduction

The Ahmadu Bello University Teaching Hospital (ABUTH) Zaria started as an institute of health in 1967, operated by the Interim Common Services Agency (ICSA) of the then Northern Nigerian Governments. It presently has 33 departments that provide healthcare delivery services to the community and fulfills training needs in Nursing and general medical practice. Before the 15th November 2005 commissioning of the Hospital's permanent site at Shika, the hospital locations were spread out between Kaduna and Zaria in Kaduna State, and Malunfashi in Katsina State (ABUTH, 2009). The hospital covers a vast expanse of land measuring 1,000 metres by 2,000 metres and has several number of units that include Accident and Emergency, Psychiatry, Ear, Nose and Throat, Physiotherapy, Female and Male Surgical wards, Paediatrics, X-ray, Pharmacy, and Obstetrics and Gyenaecology.

An investigation at the permanent site however, revealed a condition that requires a Graphic Design solution -that is the difficulties patients and visitors encounter in locating the various service delivery units within the hospital. This problem might not be unconnected with the seeming inadequacy of directional signs around the hospital. The condition has therefore prompted the premise for undertaking this research which is aimed at developing bilingual directional signs using standard medical symbols.

In developed societies, it is common practice to find various forms of signage design which help to offer guides to visitors in locating specific places –especially within busy city streets, airports, hospitals, institutions, museums, and other public places. According

to these directional signs when used in effective wayfinding solutions most cases include vicinity maps, regulatory and advanced directional signs, and corridor route panels which are placed at strategic points as initial orientation guides.

Research reveals that when applied properly, this wayfinding practice has the capacity to alleviate levels of stress and frustration, cut down on time-wasting and greatly reduced or even eliminated the need for consulting others for directions.

Signage as a means of wayfinding, is an aspect of Information Design –a discipline that is identified as the defining, planning, and shaping of the contents of a message and the environments it is presented in with the intention of achieving particular objectives in relation to the needs of users (IIID). Information design on the other hand, is a subcategory of Environmental Graphic Design or EGD, which can be defined as the graphic communication of information in the built environment (Calori 2007). According to Calori (ibid), EGD has to work with elements that have a universal meaning. The elements of this language are typography, colour, sign and symbol.

Information design like any other discipline, has perculiar challenges. Hofmann (2009) discovered there are new challenges facing visual communication, according to him;

a) How do we visualize for different culture, languages, and ages?

b) How do we visualize for new technologies?

c) Visual instructions are a good way to add or clarify meaning to supplement text, but the question still stands, "Can pictures stand alone as instructions?"

Similarly, the challenge of designing for new technologies is shared by Sam Inkinen (2010) who believes *the key challenge in information design is to improve the*

findability and browsability of digital media services. The issue borders around "navigation", which is used in connection with spontaneous information searching and associative surfing in information networks and data environments.

There is a global realization to have a language system that has a universal appeal. Nearly three hundred years ago, the German philosopher Gottfried Wilhelm Von Leibnitz predicted that someday there would exist a universal system of pictorials that could be read in all languages without having to be translated (Holmes 1989). Otto Neurath, (as cited in Ashwin, 1983) stated that "the desire for an international language is an old one, and it is more than ever in man's mind at this time of international connections in business and science." The emergence of Neurath's pictorial symbols called ISOTYPE (International System of Typographic Picture Education) in 1936 was one of the first concerted attempts in the 20th century to create uniformity in symbols (for information design) so that their meaning would be clear to all, whether or not they understood a particular language. From that time on, a lot of progress has been made in the design and development of pictograms and directional signs –a concern that has become the central focus of this research.

It is observed that communication in Nigeria could be inhibited by diverse cultural and social factors. This research is undertaken on the assertion that pictorial signs can serve as an effective means of enhancing visual communication and could be adopted to address wayfinding limitations in Nigeria.

There is evidence that the visionary leader and one of the primiers of modern Nigeria-Chief Obafemi Awolowo (1915-1987), attempted to introduce the idea of ISOTYPE in

the then Western Nigeria. Had this idea taken off, it would have potentially impacted on communication amongst the multi-ethnic, multi-lingual, multi-religious entities of Nigeria as a multi-cultural society (Ejembi, 2008).

However, a pilot test conducted by this researcher at the Federal Ministries of Communication and Health, Abuja; the National Hospital Abuja; and ABUTH Zaria, indicate that taking full advantage of symbol usage in enhancing visual communication has not become an appreciated practice in Nigeria. The findings revealed that these government organizations do not have any strategic policy that addresses symbol usage for directions.

There is evidently no national regulatory programme in place to guide the production of standard and effective wayfinding elements – especially directional signs, which are needed in public places. The pilot test conducted at ABUTH exposes that it particularly suffers a certain level of inadequacy in this regard.

In a recent report advocating the use of symbols for the health care industry in America, Cowgill J., Bolek J., and JRC Design (2003) state,

> *Throughout the world, symbol use for the medical facility appear to be limited. Most of the standardized systems in use address healthcare graphics in a peripheral manner. The majority of the system's symbols pertain to transportation, recreation, leisure and sports activities, with a small number of symbols for Ambulance or emergency. Specific medical terms such as x-ray or outpatient are not typically addressed.*

Moreover, there is no available record known to the researcher that established the link between pictographic symbols and bilingual signs as an effective means of informing visitors in medical facilities in Nigeria.

1.1 Statement of the Problem

Although it is observed that there are directional signs aimed at aiding wayfinding needs for patients and visitors to the different service locations at ABUTH, the problem of this study is to investigate whether or not these signs successfully accomplish the goal of providing directions quick, and with minimal frustration.

1.2 Aim of the Study

The aim of the research is to explore the design and development of directional signs using medical pictograms and bilingual inscriptions for ABUTH, Shika-Zaria.

1.3 Objectives of the Study

The aim of the research will be achieved through the following set objectives:

(i) Assess the role of graphic signs and symbols in visual communication;

(ii) Evaluate the effectiveness of the sign system used in ABUTH towards enhancing wayfinding for patients and visitors;

(iii) Identify graphic design principles and elements that influence the effective development of directional signs for application in ABUTH Zaria;

(iv) Develop and test bilingual wayfinding signs with standard symbols for ABUTH aimed at enhancing directions to various units of the hospital.

1.4 Research Questions

The research sought to answer the following questions:

(i) What is the role of graphic signs and symbols in visual communication?

(ii) To what extent do the existing directional signs functionally meet the purpose of directing patients and visitors to various sections at ABUTH, Zaria?

(iii) What graphic elements can influence the development of effective directional signs within ABUTH?

(iv) Which standard symbols can be used on bilingual directional signs to improve access to various units of ABUTH, Zaria?

1.5 Significance of the Study

The power of pictures to communicate across language and cultural barriers forms an important basis for this study. The development of pictograms is a valid means of enhancing communication, essentially to a general population, but especially to those with limited language skills. This study is relevant because it is aimed at enhancing the directional sign systems at ABUTH, using standardized medical pictograms and bilingual signs and symbols culturally relevant to Zaria and its environs –especially in view of the fact that the average literacy level of majority of the Zaria populace is low. Hence, this study of the view that utilizing bilingual signs and symbols would play a key role in enhancing visual literacy skills. This being a factor that would be relevant for developing standard directional signs for ABUTH Zaria.

The research should also stimulate further studies that relate to symbol design in graphic communication that would enhance both the ability of individuals to navigate complex environments, and access public services.

1.6 Scope and Delimitation of the Study

The visual language of pictograms is a communication system with diverse applications. Examples include pictogram designs for traffic signs –airports, stations, ports, vehicles; transportation and communication – package warnings, product instructions and counter instructions; education – schools, libraries, museums and book reference sections; medical facilities – hospitals, clinics, medicine use instructions, to name a few.

This research specifically focused on the development of medical graphic symbols to be used on directional signs in Ahmadu Bello University Teaching Hospital, Zaria. The study also adopted a bilingual communication medium using English and Hausa languages for translation on the directional sign system, in consonance with the major languages of communication in Zaria.

Hausa is the major indigenous language of communication in the Zaria metropolis and environs -and is widely used for business transactions and to some extent, official communications. (Schuh and Yalwa, n.d.).

1.7 Limitation of the Study

The major constraints of this research are time and finances. Lack of finance deterred the researcher's ability to use advanced technological facilities for the studio practical.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter presents a synthesis of related literature on the problem of inadequately designed and comprehensible symbols on directional signs at Ahmadu Bello University Teaching Hospital, Shika. The purpose is to examine the body of literature and ideas that have been established on pictogram and bilingual sign design. Relevant topics under review include the following:

2.1 History of symbols

2.2 History of Pictograms

2.3 Symbol use in Africa, Nigeria and among the Hausa

2.4 Prominent Designers of Pictograms

2.1 History of symbols

According to Caloris (2007), long before paper was invented, humans made marks on objects such as cave walls, in their surrounding environment. The intent of making these marks, or signs, was to communicate information visually. Because of the communication intent, these marks were imbued with meaning and became a shared language among the people who made and understood them.The oldest known symbols developed for the purpose of communication through time are the cave paintings, a form of rock art, dating to the Upper Paleolithic (Lester, 2005). Just as the small child first learns to draw before he or she masters more complex forms of communication, so Homo

sapiens' first attempts at passing information through time took the forms of simple symbols and forms painted on cave walls. The oldest known cave painting is that of the Chauvet Cave (Located in the Ardeche region of France), dating to around 30,000 B.C. (Lester, 2005).

Chauvet cave became famous in 1994 after a trio of speleologists found that its walls were richly decorated with Paleolithic artwork, that it contained the fossilized remains of many animals, some of which are now extinct. It was soon regarded as one of the most significant pre-historic art sites, along with Lascaux, Altamira, and Cosquer (Anon.[1]).



Plate I: Chauvet images
(Source: www.CoquinaDaily.com)



Plate II: Chauvet images
(Source: www.CoquinaDaily.com)

Altamira (Spanish word for 'high view') is a cave in Spain famous for its Upper Paleolithic cave paintings featuring drawings and polychrome rock paintings of wild mammals and human hands (Anon[2]). The Altamira Cave, discovered by Marcelino Sanz de Sautuola in 1879, are located in one of the hills that surround the nice valley where Santillana village is placed. Its discovery started big polemics between the archaeologists, because they did not believe that prehistoric men were able to do such perfect paintings. The main gallery, called the "polychromes chamber", is also known as the "Cappella Sistina" of the quaternary art. (Anon.[3]). These wall illustrations are not the only signs of human habitation here. Tools, hearths and food remains were preserved here for thousands of years. Altamira is the only site of cave paintings in which the signs of domestic life extend into the first cavern which contains the actual paintings (Nietering, 1996).



Plate III: Altamira image.
(Source: www.CoquinaDaily.com)

Another cave that contains some of the well-known Upper Paleolithic art (symbols), is the Lascaux cave, found in a complex of caves in the Dordogne region of southwestern France, because of their exceptional quality, size, sophistication and antiquity. Estimated to be up to 20,000 years old, the paintings consist primarily of large animals, once native to the region (Anon.[4]). They primarily consist of realistic images of large animals, most of which are known from fossil evidence to have lived in the area at the time.



Plate IV: Lascaux image
(Source: www.CoquinaDaily.com)



Plate V: Lascaux image
(Source: www.CoquinaDaily.com)

Though not well standardized, those paintings contained increasing amounts of information. The connection between drawing and writing is further shown by linguistics: in the Ancient Egypt and Ancient Greece the concepts and words of drawing and writing were one and the same (Egyptian: 's-sh', Greek: 'graphein').

These picture-symbols – referred to as pictograms, have evolved into an important aspect of communication and design throughout the world (Frutiger, 1989).

2.2 History of Pictograms

In the strictest sense pictograms are a modern invention, but they constitute a particular branch of pictorial signs, the use of which has expanded continuously thruoghout the course of human history (Anon.[5]). The first scribes of early times can be supposed to have existed in the fifth millenium B.C. in the Middle East. With the aid of signs known as pictograms, they made schematic representations of objects, dates and actions (Frutiger, 1989).

Writing, in the sense of a genuine record of thought and speech, can be said to have actually existed from the time at which drawings and signs appear in direct relation with spoken syllables, words or phrases.

According to Frutiger, Pictograms were used by various ancient cultures all over the world since around 9000 BC, when tokens marked with simple pictures began to be used to label basic farm produce, and became increasingly popular around 6000-5000 BC. They were the basis of cuneiform and hieroglyphs, and began to develop into logographic writing systems around 5000 BC.

Cunieform is a writing style that is made from wedge-shaped strokes, inscribed on clay, stone, metal, wax or other materials. Cuneiform writing has been used in several languages, and was in use for about 3,000 years, from about 3100 BCE until about the year 0. It originated in the southern Mesopotamia, and was created in the Sumerian culture, in order to write the Sumerian language. Later it was used for Akkadian, Babylonian and Assyrian. Uneiform developed into the dominant writing style of the Middle East, and even spread to Egypt, where hieroglyphic writing was normally preferred (Kjeilen, n.d.).



Plate VI: A Sumerian clay script tablet
(Source: www.elixirofknowledge.com)

In the course of the 3rd millennium B.C. the pictorial representations became simplified and more abstract. The number of characters in use also grew gradually smaller, from about 1,000 unique characters in the Early Bronze Age to about 400 unique characters in Late Bronze Age (Hittite cuneiform). Cuneiform writing was gradually replaced by alphabetic writing in the Iron Age Neo-Assyrian Empire and was practically extinct by the beginning of the Common Era. It was deciphered from scratch in 19th century scholarship.

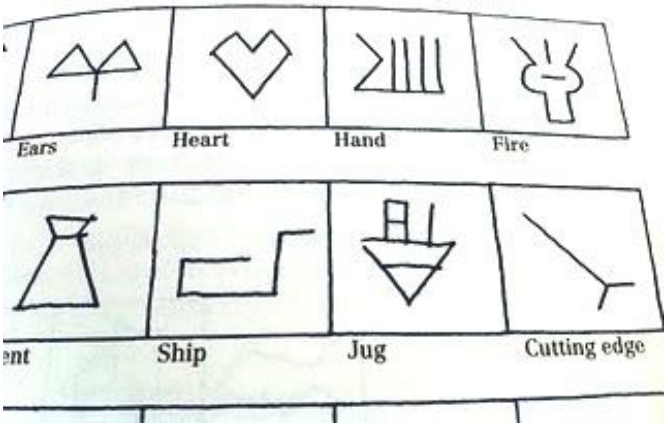


Plate VII: Earliest pictographic script, ca. 3500 B.C.
(Source: www.older-child-adoption.blogspot.com)

Egyptian hieroglyphs "sacred carving", also hieroglyphic, was a formal writing system used by the ancient Egyptians that contained a combination of logographic and alphabetic elements. Egyptians used cursive hieroglyphs for religious literature on papyrus and wood. The ancient Egyptians believed that writing was invented by the god Thoth and called their hieroglyphic script "*mdwt ntr*" (god's words). The word hieroglyph comes from the Greek *hieros* (sacred) plus *glypho* (inscriptions) and was first used by Clement of Alexandria (Anon[3]).

The earliest known examples of writing in Egypt have been dated to 3,400 BC. The latest dated inscription in hieroglyphs was made on the gate post of a temple at Philae in 396 AD. The hieroglyphic script was used mainly for formal inscriptions on the walls of temples and tombs. In some inscriptions the glyphs are very detailed and in full colour, in others they are simple outlines (Lo, 2010).

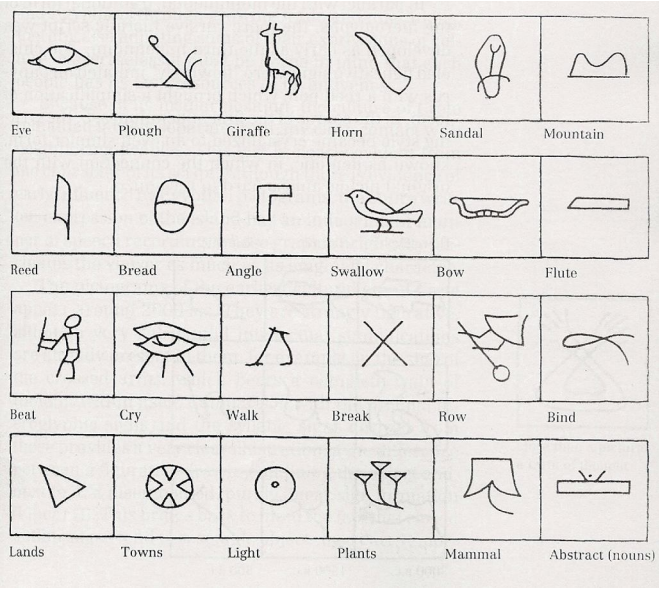


Plate VIII: Some Egyptian pictograms, ca. 300 B.C.
Source: Frutiger, 1989

Traditionally Egyptologists divided Hieroglyphs into three types based on appearance: hieroglyphic, hieratic, and demotic. Hieroglyphic is almost always inscribed on stones in large scale monuments. Hieratic is the "priestly" script extensively used on manuscripts and paintings, and really is just a rather cursive form of monumental hieroglyphics. And finally, demotic is a highly cursive script that replaced hieratic as the script for everyday use from 600 BCE onward. In fact, some demotic signs translate into more than one hieratic or hieroglyphic signs, so there isn't a one-to-one correspondence between demotic and the other two systems (Lo, 2010).

The Egyptian script culture is now seen as the most important basis of the Western alphabet.

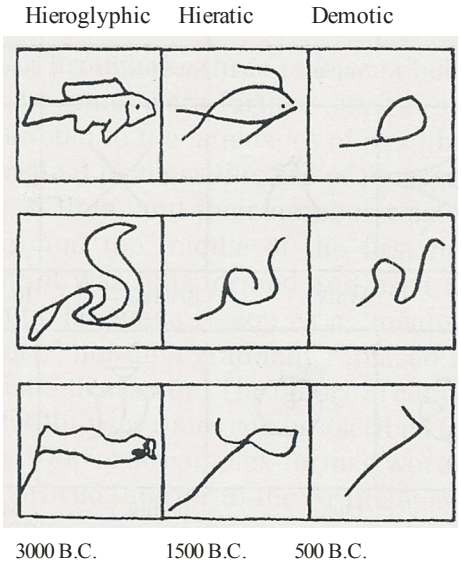


Plate VIIII: The three forms of Egyptian hieroglyphs
(Source: Frutiger, 1989)

According to an anonymous author, the earliest pictorial signs that come close to modern pictograms emerged during the invention of the printing press in the 15th century: vignettes. These small ornamental designs were originally based on foliage (*vigne* = vine), but the range of motifs soon expanded, and due course there were vignettes on religious subjects, festivals, the months, the seasons and animals. In relation to conditions at that time, the vignettes had all the features that characterize pictograms in the broadest sense.



Plate X: Vignettes used as illustrations during the invention of the printing press in the 15th century
(Source: www.brocketthorne.com)

Having emphasized the importance of pictorial symbols as an effective form of communication over the centuries, it is imparative to highlight its usage in one of the

earliest and most successful examples of modern wayfinding design - the development of the London Underground train system.

The London Underground is a metro system serving a large part of Greater London and neighbouring areas of Essex, Hertfordshire and Buckinghamshire in the UK. In order to ease navigation in what is the longest metro system, and one of the busiest in the world, a map system was introduced to help passengers locate routes to terminals without much hassles.

The earlier maps were often street maps with the lines superimposed, but as well as being visually complex, this produced problems of space, as central stations were far closer together than outlying ones (Harry, 2008).

The modern stylized Tube map evolved from a design by electrical engineer Harry Beck in 1933. It is characterized by a schematic non-geographical layout (thought to have been based on circuit diagrams) and the use of colour coding for lines (Harry, ibid).

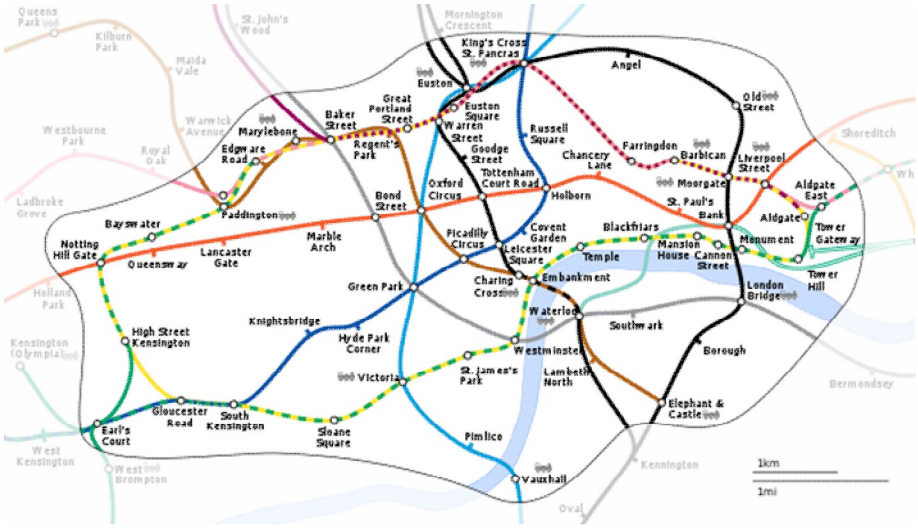


Plate XI: The London Underground Map showing colour coding for different lines (Source: Harry 2008)

The map is now considered a design classic; virtually every major urban rail system in the world now has a similar map, and many bus companies have also adopted the concept (Harry, 2008).

The British Department of Transport has further developed a family of symbols that reinforce the unique name and special historic character of the major British railroad stations. These symbols appear on signage, publications, and maps (Gibson, 2009)



Plate XII: A collection of symbols for the British Railroad Stations
(Source: Gibson, 2009)

According to Holmes (1985), no write up about pictorial symbols would be complete without some consideration of Olympic symbols. In his opinion, "the designers involved in the Tokyo, Mexico, and Munich games (1964-1972) made considerable contributions in terms of advancing the form and the cause of symbolic, non-linguistic signs." In a brief discussion, Holmes highlighted certain developments of the Olympic symbol design from 1964-1984, taking the example of "swimming" event to illustrate the evolution of a design.

Holmes' pictorial documentation reveals a gradual development in form and style representing different era of design. The London Olympics of 1948 bore embroidered sports emblems which were more literal and not really symbolic at all. The reduction of forms (designed by Katsumie Masaru) that followed the 1964 Olympics, became a basis on which subsequent Olympics symbols were developed.

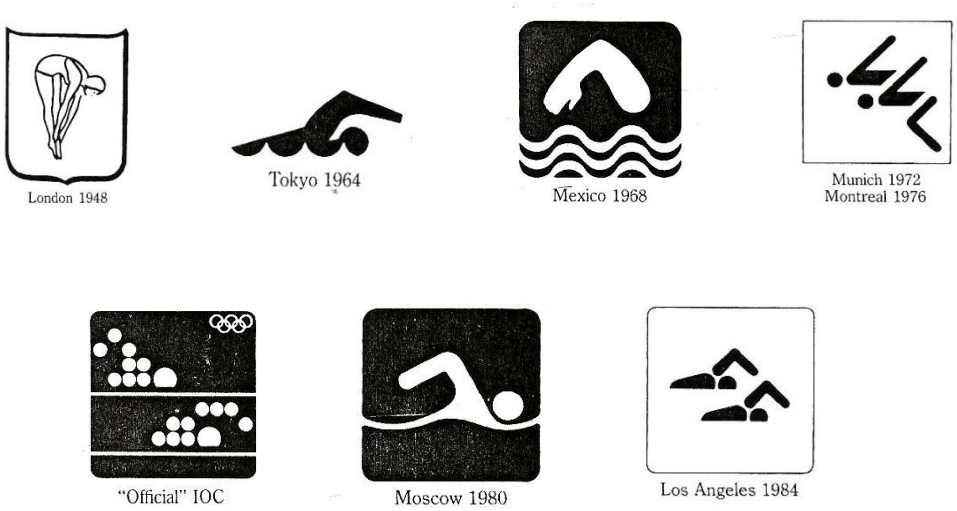


Plate XIII: Design evolution of Olympic "swimming" symbol from 1948-1964 (Source: Holmes, 1985)

Gibson (2009) also enumerated on the impact of olympic symbols to sign design. He stated that "the Olympics have become a tremendous opportunity for environmental graphic designers. Each Olympiad debuts a new symbol family and colour pallete, a graphic vocabulary, and a family of symbols for different sports that add to the visual peagantry televised around the world."



Plate XIV: Set of Olympic symbols featuring designs from the modern games (Source: Gibson, 2009).

2.3 Symbol Usage in Africa

The indigenous cultures of Africa are replete with symbols and symbolic expressions (Dzobo, n.d). According to Stepan 2001 (as cited in Smith 2009), "Africa has contributed to the world a rich tradition of typography; from ancient Egyptian hieroglyphs, to rock inscriptions found throughout the Sahara Desert, as well as rock paintings and drawings in the Tassili Plateau of the Atlas Mountains in the Fezzan." Smith states in agreement also; "the rich diversity of esoteric symbols throughout Africa has inspired both craftsmen and artists for centuries. They have refashioned the antiquated and unique into contemporary forms, which now appear etched on pottery, cast on bronze and precious metals, carved on wood, woven into textiles, stitched on cloth, or inscribed on the human body.

Though the hieroglyphic inscriptions of ancient Egypt were the earliest and most innovative sign-writing system developed by man, they can be said to have influenced the development of signs and symbols as a means of communicating ideas and messages in other traditions. Dzobo (n.d.) affirms this point, according to him;

"Many people regret the fact that, besides Egypt, the rest of Africa has not invented an alphabet system. They overlook the fact that Africans have been using both visual and oral "picture words" for a considerable time to express, transmit and store their thoughts, emotions and attitudes."

Among these indigenous symbols are those conceived by the Ghanaians. According to Dzobo (n.d.), Ghanaian symbols are used in different life situations, and on the basis of the type of contexts in which they are used, they may be classified into six major groups with unavoidable overlapping. The six groups are adinkra symbols, stool symbols, linguist staff symbols, religious symbols, ritual symbols and oral literary symbols.

The *Adinkra* symbols are the most famous of all the categories. Adinkra is a cotton cloth produced in Ghana and Cote d'Ivoire which has traditional *Akan* symbols stamped upon it. It is traditionally a mourning cloth and is normally worn "to say goodbye" to the dead and to express sympathy for the bereaved family, and is commonly seen at funerals and memorial services. The symbols on Adinkra represent popular proverbs and maxims, record historical events, express particular attitudes or behaviour related to depicted figures, or concepts uniquely related to abstract shapes (Boddy-Evans, n.d.).

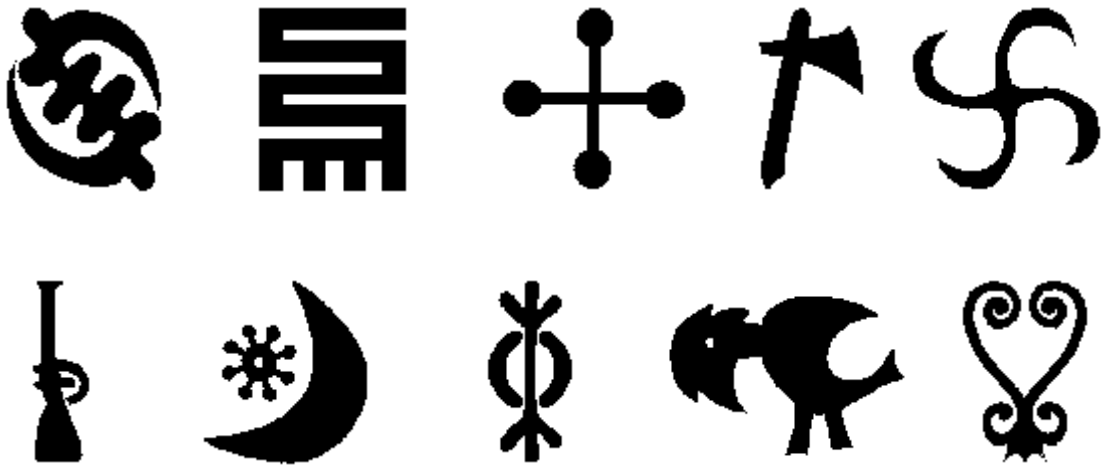


Plate XV: A collection of Adinkra symbols
(Source: www.about.com)

Over time the Asante further developed Adinkra symbolology, incorporating their own philosophies, folk-tales and culture. Adinkra symbols were also used on pottery, metal work, and are now incorporated into modern commercial designs (where their related meanings give added significance to the product), architecture and sculpture (Boddy-Evans, A. (n.d).

Very recently –in March 2009, the Ghanaian government, to commemorate fifty years of independence, added a sign to the Adinkra collection known as *Fawohodie* which means independence, freedom, or emancipation (MacDonald, 2007).

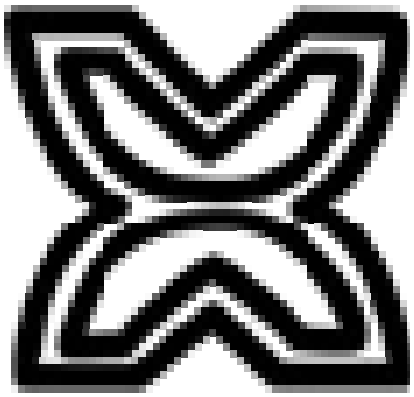


Plate XVI: Adinkra "Fawohodie" sign
(Source: www.adinkra.org)

The Edo people –an ethnic group in the South-West of Nigeria also use a unique style of writing based on different colour combinations and graphs. Instead of using a large amount of graphic symbols, only a few symbols are used, and the colour of each symbol determines the meaning (Anon.[6]). The system is also called quantography or pictography with impressive juxtaposition of colours with emphasis on pink, blue, and yellow. If you look closely, each script is different than the other and so is the colour placement.

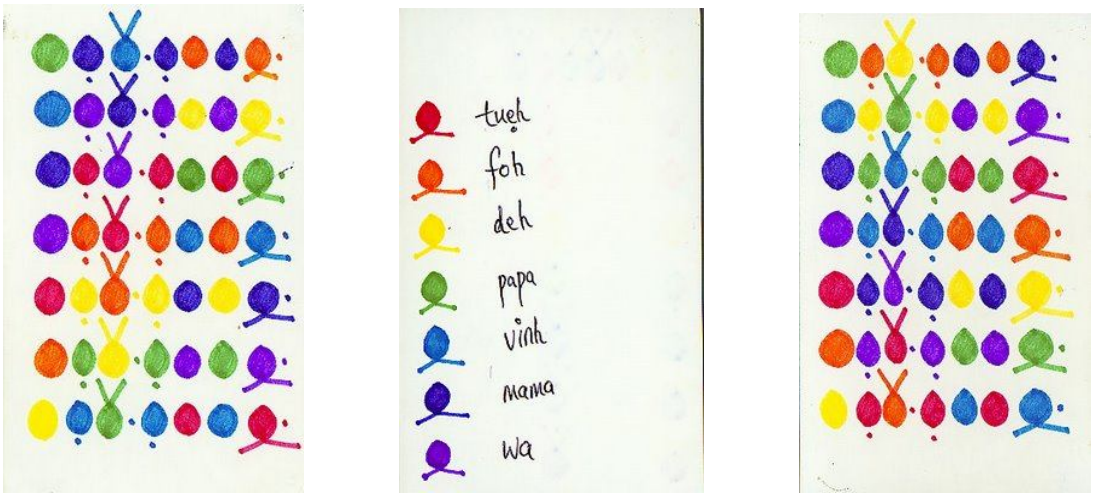


Plate XVII: Edo writing style depicting colour pictographs
(Source: www.fractalenlightenment.com)

The Igbo people in South-eastern Nigeria are also famous for a semiotic tradition referred to as *Uli,* a picture language which communicates ideas and is used to beautify objects. Okpala (1972) and Udechukwu (1990) (as cited in Chudu-Duru 2011) imply that Uli could have started as a form of sign language or some kind of cosmic art which started on the human body and later moved to the walls of private homes and other traditional items like doors and earthen ware.

For the Igbo, uli or body painting was a relevant form of graphic communication. A woman's skin was used as a portable canvas upon which symbols and designs were painted that defined a woman's beauty. Plus, designs showed the inter-relationship between the individual and society; while demonstrating an uli artist's creativity and skill. Uli symbols and patterns were also painted on the walls of dwellings, compounds, and communal shrines. In Igboland, uli was a feminine art form, and the design repertoire of the artist varied from village to village as did the compositional forms,

designs, and motifs. However, uli was not a secret script. The symbols used by Igbo women artists represented things of physical importance, had aesthetic appeal, and were intended to beautify the female body or clay/mud walls--as beauty was equated with morality in Igbo culture (Smith, 2009).

On the other hand, the Igbo used a secret ideographic form of writing that relied on concentric circles, lozenges, spirals, stars, and numerous other abstract markings to build a complex script, which was called *nsibidi*. And unlike other writing systems the purpose of *nsibidi* was not to make information accessible, but to convey esoteric messages and guard valuable knowledge within an elite male association (Carlson 2007: 146). It was a form of graphic communication indigenous to the Ejagham people of south-eastern Nigeria in the Cross River region, and was typically associated with ritual in secret male organizations such as the Leopard Society that historically acted as a form of "law enforcement"



Plate XVIII: Example of *Uli* painted on dwelling walls.
(Source: Smith, 2009)

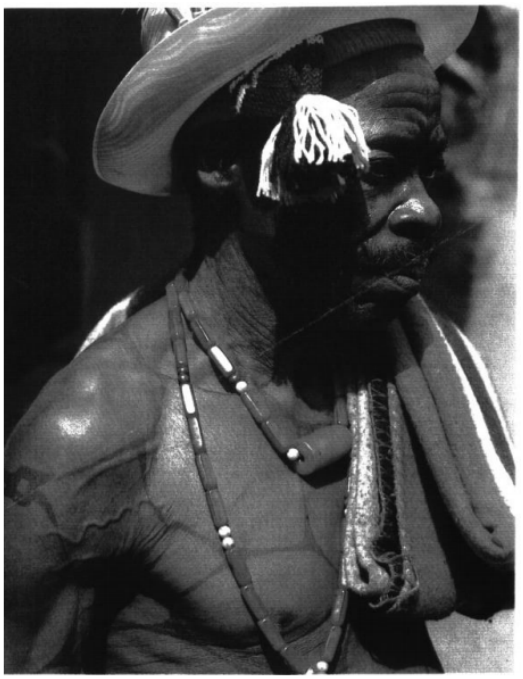


Plate XVIIII: Simple *uli* patterns painted on a man's chest and shoulder.
(Source: Smith 2009)

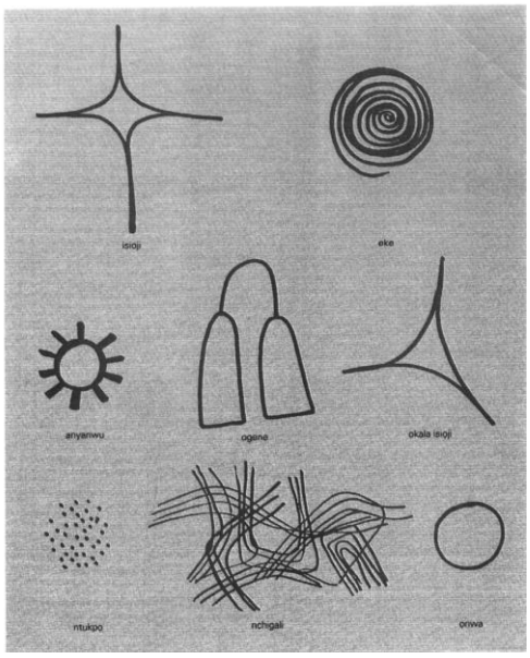


Plate XX: *Uli* motifs, drawn by Sylveter Ogbechie
(Source: Smith, 2009)

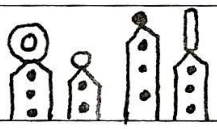
S/N	NAMES OF DESIGN MOTIFS PICKED	DESIGN MOTIFS PICKED
1.	Agwọlagwọ (Nri) (Concentric Circles)	
2.	*Aju nwa agbọgho* (Young girls pad for carrying something on the head	
3.	*Ihe ọlụ* (tools)	
4.	*Amadioha* (Thunder)	

Plate XXI: Collection of Uli traditional motifs for rug weaving.
(Source: Duru, 2011)

The Northern part of Nigeria is not exempt from the rich tradition of symbol design practiced by other geographical regions of the country. In Hausaland particularly, decoration of all kinds can be found on a large number of items from clothes, embroidery and weaving, to dyed and printed items, and also found on calabashes, clay and musical instruments. Other decorated items include leather work, such as horse trappings, sandals and covers for the Qur'an; basketry, including all sizes of mats, woven trays, local fans; wood carvings; calligraphy; body decorations, and both internal and external wall decorations (Scwherdtfeger, 2007).

According to Scwherdtfeger, "because of limited documentation, it is difficult to more than hypothesize about pre nineteenth century decoration in Hausaland. Judging from a few descriptions available, it is likely that decorative patterns and motifs were used on a wide variety of items as earlier mentioned."

The introduction of Islam in Zaria in 1808, found a very rich and varied cultural tradition in Hausaland, with a very large variety of patterns being used to decorate houses and tools. The establishment of the Sokoto caliphate had a huge influence on symbol usage in Hausaland and its prominent craft of home decoration in Zaria. Uthman dan Fodio the caliph, and fellow leaders in important Hausaland disapproved of decorative houses and lavishly embroidered dresses (Grabar, 1973). The prohibitions centred on drawing or painting human beings or animals, as this is the prerogative of God (Scwherdtfeger, 2007).

In Zaria, pictographic symbols are all-pervading on wall decorations. Apart from a few exceptions, vegetal and floral motifs, geometric patterns, usually described as arabesque decorations, as well as abstract imitation and non-abstract objects, such as hoes, guns, aeroplanes, motorcars and bicycles were prominently displayed on a number of houses, mostly belonging to rich traders.



Plate XXII: House with external wall decorations depicting abstract patterns and floral motifs.
(Source: Schwerdtfeger, 2007)



Plate XXIII: Decorated entrance with large floral patterns
(Source: Schwerdtfeger, 2007)

The most prominent among these structures in the ancient Zaria city, is the Emir's palace –known as *Kofar Gida*. During the last 45 years in which the various decorations on the

Kofar Gida were created, the *dagi*, the staff of office, the crown and the sword, as well as several abstract decorative motifs, appear on all four recorded decorations (Schwerdtfeger, 2007).

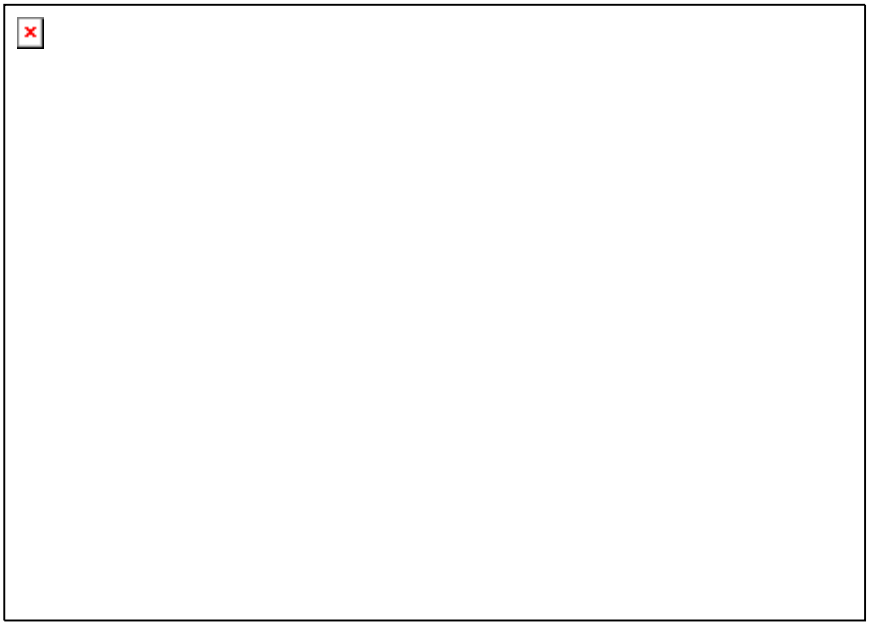


Plate XXIVa: Non-abstract objects and floral motifs
(Source: Schwerdtfeger, 2007)

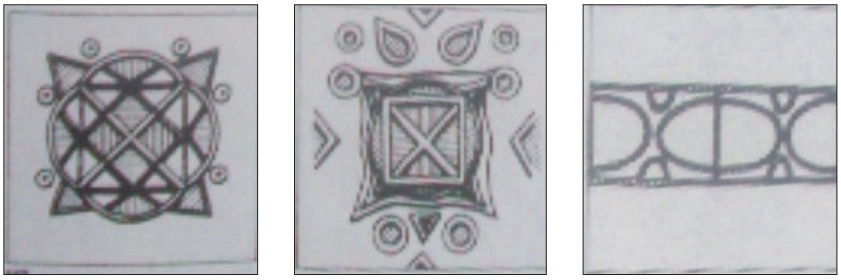


Plate XXIVb: Abstract imitations and geometric patterns
(Source: Schwerdtfeger, 2007)

Schwerdtfeger also observes that some other decorative motifs may be found on the building, their size had decreased and they are more numerous. This is a contrast with older builder-decorators who used large pictographic symbols for external wall

decorations to convey an idea of the profession, power, wealth and influence of the inhabitants of the house or compound.



Plate XXV: The entrance to the Emir's palace, Zaria
(Source: Schwerdtfeger, 2007)



Plate XXVI: A densely decorated calabash belonging to a Nomadic Fulani woman of Potiskum area.(Source: www.webpulaaku.net)

The background of this historical literature established that pictorial symbols are not an entirely new aspect of communication to the Hausaland environment. The surviving art

of dyeing, wall and calabash decoration, with patterns, symbols and various geometric shapes is evidence of a culture that could readily assimilate innovations in symbol graphics for a new directional sign system.

2.4 Prominent Designers of Pictograms

Though symbols have appeared in signs for thousands of years, it has only been since the 20th century that there were concerted efforts to create uniformity in the symbols so that their meaning would be clear to all, whether or not they spoke the native language.

2.4.1 *Gottfried Wilhelm Leibniz*

Gottfried Wilhelm Leibniz (1646-1716) was a German philosopher and mathematician who wrote primarily in Latin and French.

Leibniz thought symbols were important for human understanding. He proposed the creation of a *characteristica universalis* or "universal characteristic", built on an alphabet of human thought in which each fundamental concept would be represented by a unique "real" character:

> It is obvious that if we could find characters or signs suited for expressing all our thoughts as clearly and as exactly as arithmetic expresses numbers or geometry expresses lines, we could do in all matters *insofar as they are subject to reasoning* all that we can do in arithmetic and geometry. For all investigations which depend on reasoning would be carried out by transposing these characters and by a species of calculus.

Though the characters of this human language by Leibniz were not actualized and put to use, it is a proposal that supports the bedrock of this research.

2.4.2 *Otto Neurath*

Otto Neurath (1882-1945) is another pioneer of symbol design. A philosopher, sociologist and educator, he introduced ISOTYPE (International System of Typographic and Picture Education) along with his wife Marie Reidemeister and illustrator Gerd Arntz in 1936. It is a set of pictographic characters used to create narrative visual material, avoiding details which do not improve the narrative character.

The Oxford international English Dictionary describes ISOTYPE as follows;

> *a conventionalized pictographic symbol (as a drawing or outline or silhouette of a human figure or of a building or of a product) designed to represent (as by repetition or fractionalizing of each symbol or as by scaling each symbol to significantly the same size or to contrasted sizes) a fixed number or quantity of other unitary fact about the thing symbolized or designed to convey other information and typically used in a graphic statistical representation (as diagrams and charts).*

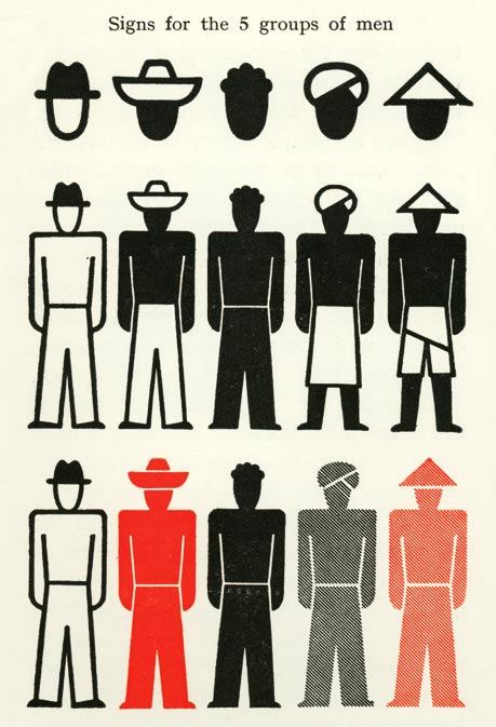


Plate XXVII: Chart from Neurath's *International Picture Language* (1936) depicting a newer alternative symbolization of the different human races.
(Source: Cabinet Magazine)

ISOTYPE was designed as an alternative to written script ("adapted to the child's mind"), as a pictorial means of communicating information about directions, events and objects, and complex relationships in space and time.

Though ISOTYPE failed as a means of communication (in part because educators favored written words over pictures), Neurath's "international picture language" laid the foundation for international graphic symbols for the pictographic signals of airport, train station, and highway signs.

The concept of pictorial/symbol graphics suggested by this research agrees with Otto Neurath's ISOTYPE design.

2.4.3 *Charles K. Bliss*

Charles K. Bliss (1897–1985) was an Austrian semiotician and inventor of Blissymbolics. Bliss said that the symbols on his father's circuit diagrams made instant sense to him. They were a "logical language". He was similarly impressed by chemical symbols which he thought could be read by anyone, regardless of their mother tongue.

It was in 1940, in Shanghai, that Bliss became interested in Chinese characters, which he mistakenly thought were ideograms. He studied them and learned how to 'read' Chinese newspapers. However, he was actually translating them into German without going through the Chinese spoken word. With ideograms for his inspiration, Bliss set out to develop a system of writing by pictures. At that time Bliss had not become aware of Gottfried Wilhelm Leibnitz's "Universal Symbolism".

His semiotic ideas met with universal rejection. Originally Bliss had called his system "World Writing" because the aim was to establish a series of symbols that would be understood by all, regardless of language. Bliss then decided an English-language name was too restricted and called the system Semantography. In Sydney in 1949 Bliss published the three-volume *International Semantography: A non-alphabetical Symbol Writing readable in all languages*. There was no great positive reaction. For the next four years Claire Bliss sent 6,000 letters to educators and universities, to no better effect.

In 1965 Bliss published a second edition of his work, *Semantography (Blissymbolics)*. It was about this time that the increase in international tourism convinced many that only a pictorial symbol language could be understood by all. Bliss made sure his idea was attached to his name, hence Blissymbolics.

In 1971 Bliss made the happy discovery that, since 1965, children with cerebral palsy at a particular centre in Canada were being taught to communicate with his symbols. Bliss saw it as a vindication. The world copyright for use of his symbols with handicapped children was licensed to the Blissymbolics Communication Foundation in Canada. Since 1971, Blissymbolics have been used mainly as a communication aid for people with communication, language and learning difficulties. Such people have limited or no ability to use ordinary spoken and/or written language but manage to learn Blissymbolics.

Notable features: Blissymbolics consists of over 2,000 basic symbols which can be combined together to create a huge variety of new symbols. The symbols can be formed into sentences and their order is based on English word order

The symbols are made up of simple shapes designed to be easy to write. Blissymbolics are used in over 33 countries.

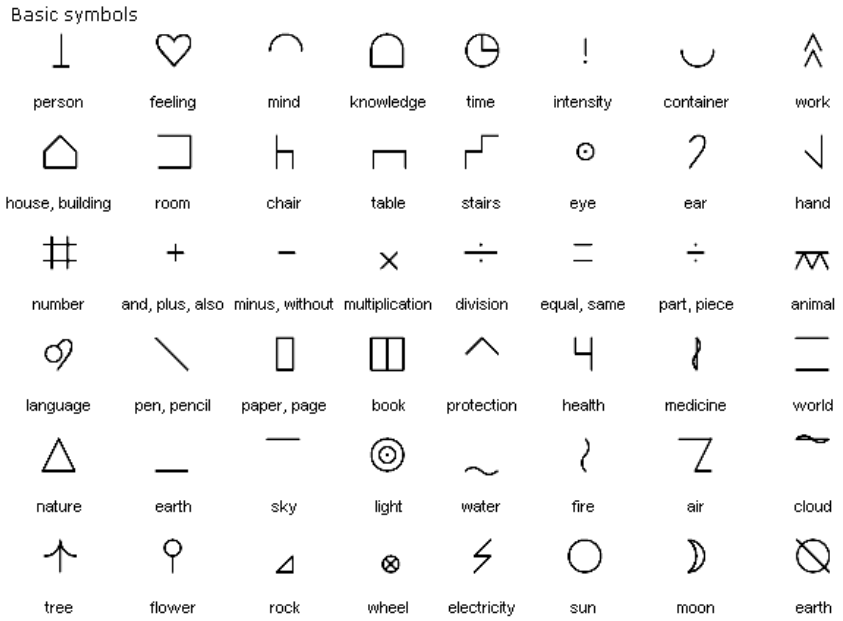


Plate XXVIII: A selection of Blissymbolics symbols

The use of symbols in communication is also highlighted in the concept of Blissymbolics. However, the fact that the symbols have to be learned over time before they are understood makes them unsuitable for the purpose of directions - which demands immediate impact and comprehension.

2.4.4 *Otl Aicher*

Otl Aicher (1922 -1991), was a type designer, author, teacher and one of the leading German graphic designers of the 20th century.

Aicher's extensive practical and theoretical work represents an expanded and refined structural functionalism, and demonstrates an holistic and rational approach to visual communication on the basis of its social relevance.

Aicher may be best known for being the lead designer for the 1972 Munich Olympics. He created a new set of pictograms that paved the way for the ubiquitous stick figures currently used in public signs.



Plate XXVIIII: Otl Aicher's set of pictograms for the 1972 Munich Olympics

He also created the first official Olympic Mascot, a striped dachshund named Waldi. The figures and symbols created by Aicher are in consonance with the theory of ISOTYPE. His designs were particularly meant to be used on design of public signs which is in conformity with the aim of this study.

2.5 Discourse on Medical Symbols

It is important to give emphasis to literature that deals with the research problem in the context of current studies relating to the subject of hospital symbols.

The most recent comprehensive material on design of signs for hospital use was compiled by Cowgill, Bolek and JRC Design. It was a research commissioned by Hablamos Juntos to JRC Design in the United States with developing recommendations for program standards for signage to serve Limited English Proficiency (LEP) patients in a variety of health care settings across the health care delivery system.

JRC Design compiled reports of different medical symbol related researches across different cultures. The most appropriate report chosen for this review was a system developed by Professor Ravi Poovaiah of ITT Bombay in India – a country that shares demographic similarities with Nigeria. The author noted that

> Communication in India are constrained by factors arising from the diverse cultural, traditional [linguistic] and social backgrounds of its people. This drawback is related to the simple linguistic and cultural fact that in India, there are as many as 14 major languages and about 1,600 dialects. Secondly, many of its adults are perhaps functionally literate but are literally illiterate. Thirdly, people

do not communicate easily because of boundaries determined by the cultural-traditional-social denominators of gender-divide that limits the mixing between the sexes, or among different castes or religious communities.

Five major hospitals run either by the government or the municipality within the city limits of Bombay were therefore chosen for a study of the potentials of symbol development. The results of the study revealed that there were several problems deriving from the absence of a sign system. There was a great degree of confusion that resulted from using number/numerical system for identifying the departments, counters, etc. it was found, for instance, that 35-40% of the first-time users ended up in the wrong queues. Since the queues were lengthy on account of high patient turnouts, the patient often wasted over half an hour to simply realize this error. It was felt that visual symbols, appropriately used could go a long way in ameliorating these avoidable conditions. (Cowgill J.,Bolek J., and JRC Design 2003).

Plate XXX shows some of the symbols developed by ITT India for use in private and government hospitals.

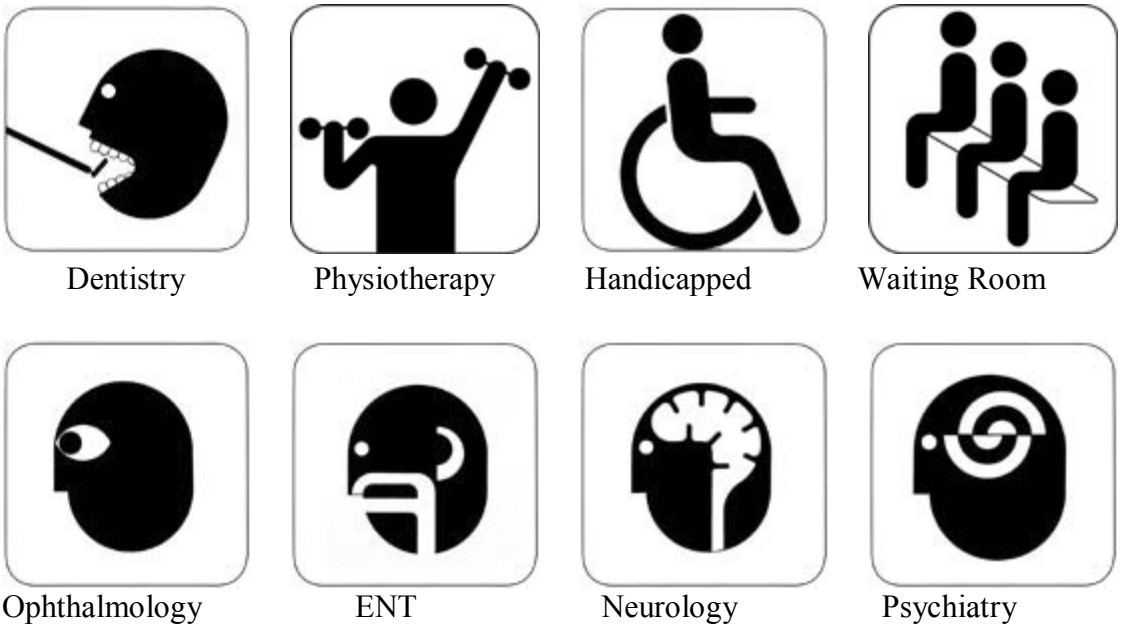


Plate XXX: Samples of hospital symbols developed by ITT Bombay, India (Source: designofsignage.com)

The JRC report reached the following conclusions:

- That symbol signage is an effective means to communicate across languages and cultures, therefore a collection of hospital symbols could be collected and tested per standards developed by the International Organization for Standards and adopted on signs in US hospitals;
- Attractive, well planned signs, whether they include symbols or not, add to the overall effect of creating a pleasant experience within a building or campus. Coordination with the site architecture creates a feeling of quality. Coordination within the sign system creates cohesion and adds to the effectiveness of the wayfinding and navigation throughout the site;
- The need to choose and maintain a limited number of fonts to be used on signs, as well as careful use of colour- especially when developing colour coding (Cowgill J.,Bolek J., and JRC Design 2003).

In a related study, Rousek and Hallbeck (2010) analyzed a wide variety of standardized healthcare pictograms and the effects of colour contrasts and complexicity for

participants with both normal and impaired vision. The study showed that certain colour contrasts, complexities and orientations can help or hinder comprehension or signage for people with and without visual impairment. High contrast signage with consistent pictograms involving human figures (not too detailed or too abstract) is most identifiable. Standardization of healthcare signage is recommended to speed up and aid the cognitive thought processes in detecting signage and determining meaning. These fundamental signage principles are critical in producing an efficient, universal wayfinding system for healthcare facilities.

In an overall sense, this discourse distinctly highlights the value of visual literacy in signage systems. Visual literacy has been defined as the ability to understand, and ultimately to think, create, and communicate graphically (Thibault, M. and Walbert, D. n.d.). Generally speaking, the visually literate looks at an image carefully, and with an eye for the intentions of the image's creator. These images can be applied to any type of image: photographs, paintings and drawings, graphic art (including everything from political cartoons to comic books to illustrations in children's books) films, maps, and various kinds of charts and maps.

Visual literacy is something that can be learned, just as reading writing are learned. Although not taught in schools (yet), it is nevertheless very important to have the ability to process visual images efficiently and understand the impact they have on viewers (Thibault, M. and Walbert, D. ibid).

2.6 Summary

In a broad and comprehensive method, the review touched on the importance of symbol graphics in communication. From the historical point of view, it gradually highlighted the problem of the study – which is the absence of pictorial symbols on hospital direction signs.

The research questions were clearly addressed by JRC report which reached conclusions from a compilation of various symbol related studies. It is anticipated that the result of this research will attend to the shortcoming of symbol graphics on directional signs in Ahmadu Bello University Teaching Hospital, Shika.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The purpose of this study is to explore the design and development of directional signs using medical pictograms and bilingual inscriptions for ABUTH, Shika-Zaria as a means of enhancing communication to both literate and non literate visitors. The methods and procedures that were employed in this study include the research design, population, sample/sampling technique, instruments, administration of research instruments and procedure for data collection.

3.1 Research Design

The research design adopted for this study was the survey method. A survey typically examines a sample from a population, and it also deals with the systematic collection of data from a population through interviews or questionnaire technique (Ngu 2009). It was used to obtain information necessary to answer the research questions. The process involved the following stages:

i) Analysis of existing directional sign items in Ahmadu Bello University Teaching Hospital;

ii) Questionnaire administration, tests and Interview schedules with sample subjects and hospital staff to determine the outcome of way finding evaluation, and

iii) A pre-test which was carried out in order to finalize and clarify many aspects of the planned study.

The application of this survey within the context of graphic symbols and typographic communication research was as it is in analytical examination of existing directional signs at Ahmadu Bello University Teaching Hospital, Zaria. Survey research has been used by a number of studies related to methodical observations and content analysis. Obisesan (2009) employed the survey method in a research to analyze cultural elements in some selected multinational print advertisements in Nigeria. From a pool of 180 questionnaires administered to consumers and designers, 69.2% were of the opinion that multinational advertisements impose a foreign culture unto the local culture.

Respondents from both consumers and designers implied that in a cross-cultural situation, the use of signs in advertisements is considered to be an effective way of communication. A summary of views in advertisements that do not reflect cultural values indicated that communication link between advertiser and consumers could be broken, thus leading to poor response to advertising messages.

Boyo (1989) also adopted the survey method to measure the impact of package design on consumers in Zaria metropolis. The justification was that the approach lends itself well to public opinions or behavior of large populations sampled within a specific time frame, and is used as a basis for predicting future behaviour. Through the use of questionnaires in this study, consumers of packaged food responded to the characteristics of colour, shape and texture. From the outcome, most consumers felt that an attractive package contributes significantly to consumers' decision to buy the food product regardless of the actual flavor and appearance of the food.

Most respondents also preferred the high textural treatment of package content illustrations as against designs with medium texture and no texture.

Consumers also recorded the highest number for product recall with cylindrical forms. As noted by Cox (in Boyo 1989), the survey method is the only means of collecting primary data on most demographic and characteristics of population, attitudes and opinions, motivations, intentions and awareness of knowledge.

3.2 Population

Kolo (ibid) affirms that the issue of population in research goes beyond people. It can also refer to a well defined set of events, materials, and observations. The primary population of this study consists of patients, caregivers, visitors and staff at ABUTH, Shika, while the secondary population consists of directional signs in ABUTH, Shika.

3.3 Sample/Sampling Technique

Purposive sampling was used to select the samples from primary population in ABUTH for analysis. This type of sampling ensures that only elements that are relevant to the research were included – in this case the patients, caregivers, visitors and ABUTH staff and students. Data for the study was collected from representative samples of the population.

The sampling technique employed for selecting samples from which data was collected for this study is the cluster sampling method. The nature of the population makes this method of sampling appropriate for data collection since the validity of the adopted research instruments for this study is based on population samples' opinions. The samples were classified into three clusters; cluster one consisted Patients/Visitors/Caregivers, cluster two was made up of Hospital Staff, and cluster three had students. Representative samples from each cluster were then selected.

According to Gall (as cited in Ahuwan 2007), a sample should be large enough to ensure representativeness in any population. He suggests 2% from every population of 1000 and below, 5% from every 5000, and 10% of every 5000 to 10,000. The figures obtained from Ahmadu Bello University Teaching Hospital records imply a sample of 2% for all the clusters (since they fall below 1000). However, to avoid the threat of bias as well as ensure proportionate representation, the percentage of the population was raised to 10. Sambo (2005) states that educational methodologists and statisticians consider the selection of an unbiased sample for a study as the most important aspect of research design. The samples therefore, translate thus: 25% for patients, caregivers and visitors, and 25% for hospital staff and 15% students.

3.4 Instrumentation

Three instruments were used to collect data for this study; interview, test and a set of questionnaires. The schedule-structured interview was administered on visitors, patients, caregivers and hospital staff to determine the outcome of way- finding assessment on the population. According to Frankfurt-Nachmias and Nachmias in Sambo 2005, the reliability of this method of interview for the research satisfies these assumptions:

i) "The respondents have a sufficiently common vocabulary so that it is possible to formulate questions which have the same meaning for each of them;

ii) That it is possible to phrase all questions in a form that is equally meaningful to each respondent;

iii) That if the meaning of each question is to be identical for each respondent, its context must be identical and, since all preceding questions constitute part of the contexts, the sequence of questions must be identical."

The test comprised randomly sampled symbols which were used to assess the symbol recognition skills of the primary population, which in turn ascertained the percentage for standardization and adoption.

3.5 Validity of Instruments

In order to determine content validity and reliability, the designed questionnaires were pre-tested on focus groups of the sample population. Modifications were effected on the syringe and needle symbol (Injection Room) after the tests - to make it less abstracted than it appeared. Results of the field work indicate that a significant increase of respondents were better able to comprehend the adjusted symbol.

3.6 Method of Data Collection

Data for this study was generated in two ways; a one-on-one interview session with the head, works and maintenance department was conducted by the researcher. The Likert-type five point scale questionnaire was also used to assess the ability of patients, caregivers, and visitors to find their way within the hospital (the researcher utilized the help of an assistant to administer the questionnaire verbally to those that were illiterate). Another Likert-type five point scale questionnaire was also used to determine staff and students' evaluation of wayfinding activity within the hospital.

3.7 Procedure for Data Analysis

The data collected was analyzed using both quantitative and qualitative analysis. The quantitative data was discussed with the help of Likert-type five point scale a direct questionnaire and a symbol recognition test for interpretation of findings. The qualitative data was analyzed using tables, percentage, pie and bar charts. Numerical data obtained from symbol recognition test scores was subjected to statistical analysis using the percentile scoring method. Sambo (2005) points out that the idea of calculating an average score is to obtain one score that could be used in some manner as representing all the scores.

CHAPTER FOUR

ANALYSIS OF DATA AND RESULTS

4.0 Introduction

This chapter focuses on analysis and discussion of the data collected from the fieldwork, as well as description of studio work. It follows the objectives of the study and carefully highlights the result of each objective. This chapter therefore presents the results of all the activities carried out to establish facts that have come to light through various investigations.

4.1 Presentation of Data Collected and Analysis

4.1.1 Questions related to staff and students' evaluation of wayfinding within ABUTH (Appendix 1)

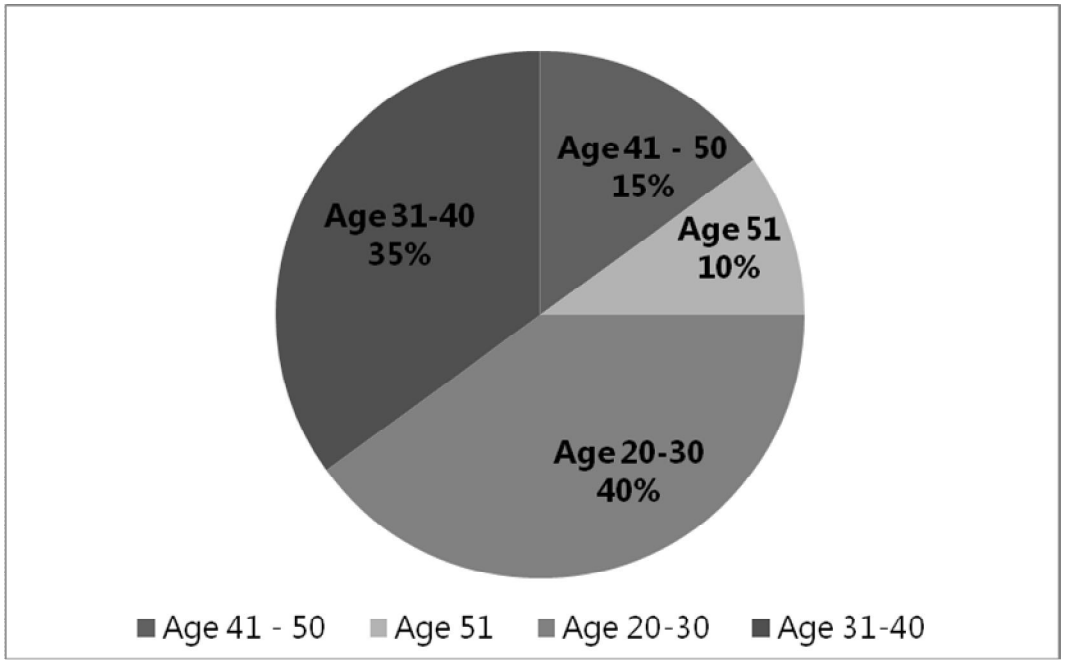


Fig.1: Demographic characteristics of appendix 1 showing age distribution.

Figure 1 presents the age difference of staff, students, doctors and nurses. The chart reveals that majority of the respondents are between the ages of 20-30 (represented by 40%).

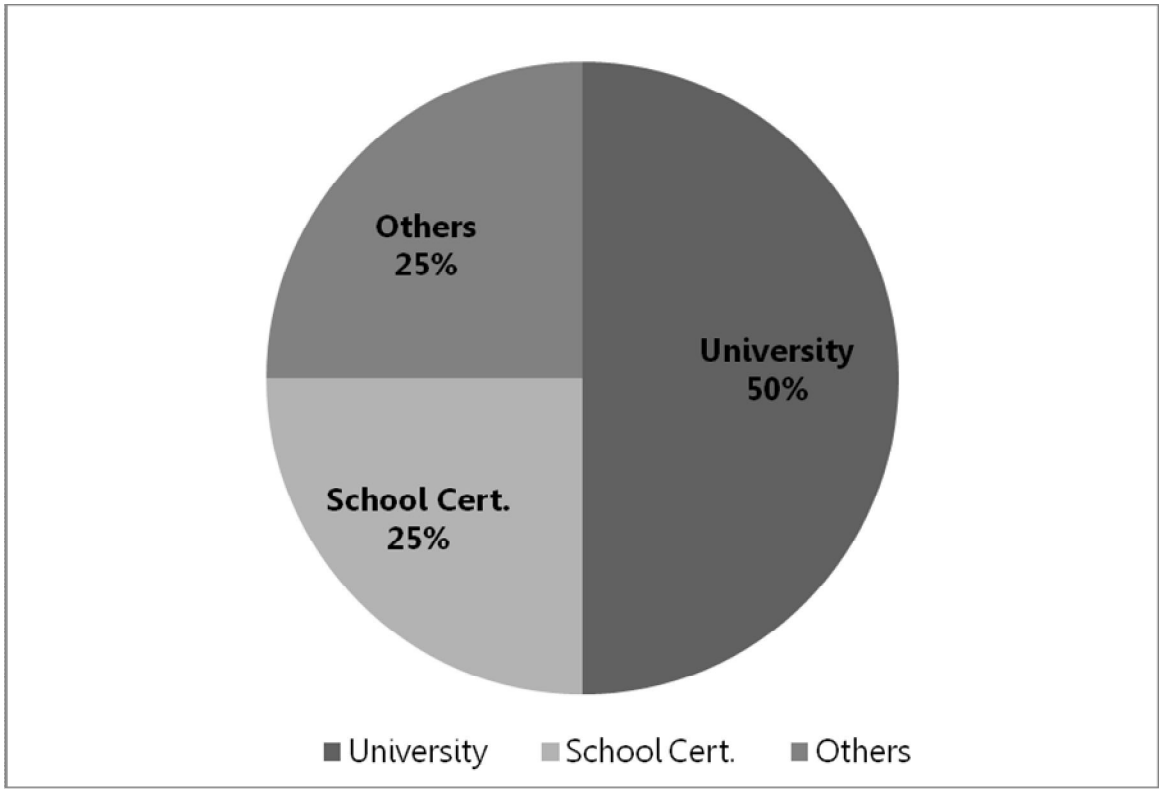


Fig. 2: Educational qualification of respondents

Figure 2 shows the educational qualification of staff, students, doctors and nurses. It indicates that 50% are University graduates degrees or higher certificates, while 25% represent those with school certificates and an equal number of respondents indicating that they have other qualifications not listed.

4.1.2 Research Question 1: To what extent do the existing directional signs functionally meet the purpose of directing patients and visitors at Ahmadu Bello University Teaching Hospital, Shika?

Figure 3 presents the percentage scores for each question in appendix I. The questions were related to staff, students, doctors and nurses evaluation of wayfinding activity within the hospital.

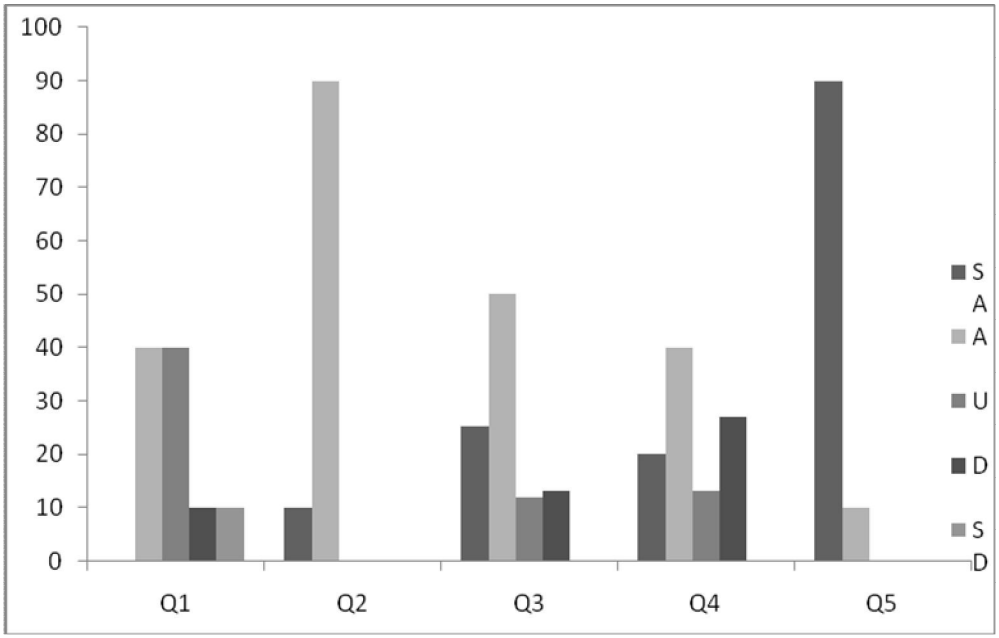


Figure 3 a: Percentage scores for staff, students', doctors and nurses evaluation of wayfinding activity within the hospital.

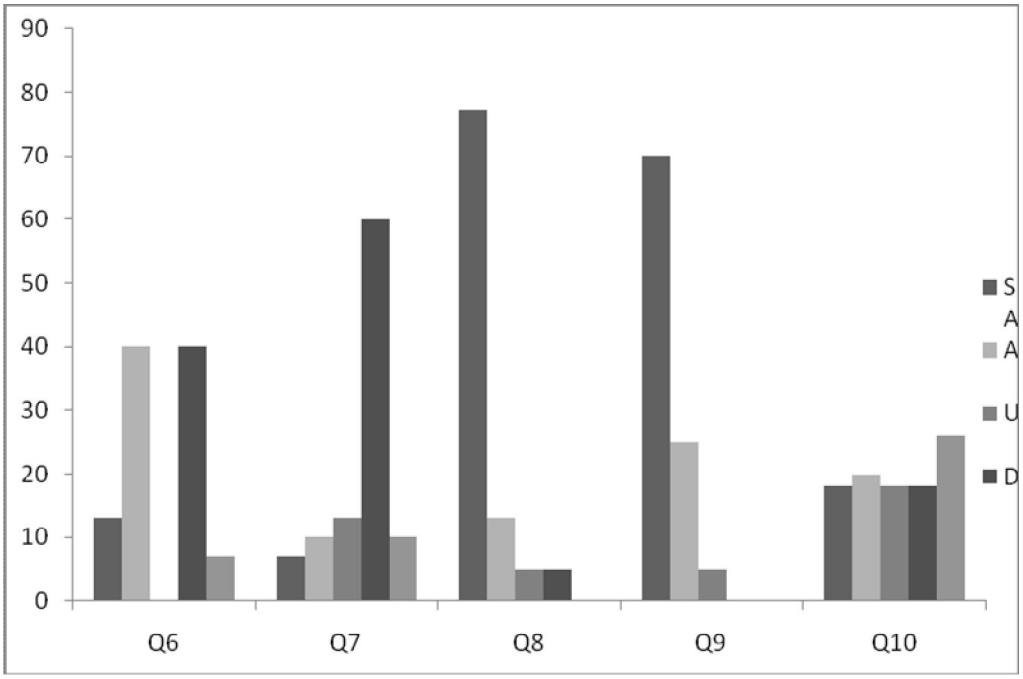


Fig. 3b: Percentage scores for staff, students', doctors and nurses evaluation of wayfinding activity within the hospital.

4.1.2.1 Level of Agreement

Figure 3 presents the percentage response value on the agreement to research question one which sought to know the extent to which the existing directional signs functionally meet the purpose of directing people in the hospital. It was administered on hospital staff and students (see appendix I)

Question 1 on the table states: "Do patients, caregivers and visitors express difficulty in finding their way while in the hospital?" The result shows that 40% of the respondents strongly agreed and 40% also agreed. 10% of the respondents were indecisive while another 10% disagreed. The result indicates that majority of patients, caregivers and visitors are aided by hospital staff, students and others in order to locate service sections at ABUTH.

Question 2 states: "Do you often help direct people while on duty?" 10% of the respondents strongly agreed and 90% agreed in support of this statement. Majority of the respondents therefore agreed to assisting people locate various sections of the hospital while on duty.

Question 3 states: "Do you use the existing signs as a directional aid?" 25% strongly agreed in response, 50% agreed, 12% were indecisive while 13% disagreed. On the whole, majority of respondents agreed that they use the existing signs in their directions.

Question 4: "Are the existing signs are helpful in your directions?" 20% of the entire population strongly agreed, 40% agreed, 13% were indecisive and 27% disagreed. Therefore majority of the respondents agreed that the existing signs are helpful as a directional aid.

Question 5: "Is it important to have directional signs within and around the hospital?" An overwhelming 90% strongly agreed to this suggestion, and 10% agreed in support.

Question 6: states: "Is the quality of the existing signs good enough by your evaluation?" 13% of the respondents strongly agreed that the quality of the existing signs is good enough, 40% agreed while another 40% disagreed and 7% strongly disagreed.

Question 7 states: "Is the number of signs available in ABUTH adequate for the hospital?" 7% responded that the number was sufficient, 10% strongly agreed, 13% were indecisive. 60% of the respondents disagreed while 10% strongly disagreed.

Question 8 states: "Should Pictorial symbols should be used on directional signs in the hospital?" A total of 70% strongly agreed to this proposition, 13% also agreed while 5% were indecisive and 5% disagreed.

Question 9: "Should Hausa text should be included in the directional signs?" 70% of the respondents strongly agreed with this statement, 25% agreed and 5% were indecisive.

Question 10: "Was the importance of signs highlighted in your training?" 18% of respondents strongly agreed, 20% agreed, 18% were indecisive while another 18% disagreed and a majority 26% strongly disagreed.

The result of the data presented in figure 3 confirms that patients, caregivers and visitors find it difficult to locate service units in Ahmadu Bello University Teaching Hospital. It is also evident that most staff help in directing people while on duty –a majority of them use the existing signs in their direction.

The importance of signs within and around the hospital was also expressed from the results with a good number in agreement that the quality and quantity of existing signs was not good enough. The outcome of the data also suggests that pictorial symbols as well as Hausa sub text should be incorporated on subsequent directional signs.

4.1.3 Questionnaire administered on patients, caregivers and visitors to assess their ability to find their way within the hospital (Appendix 2)

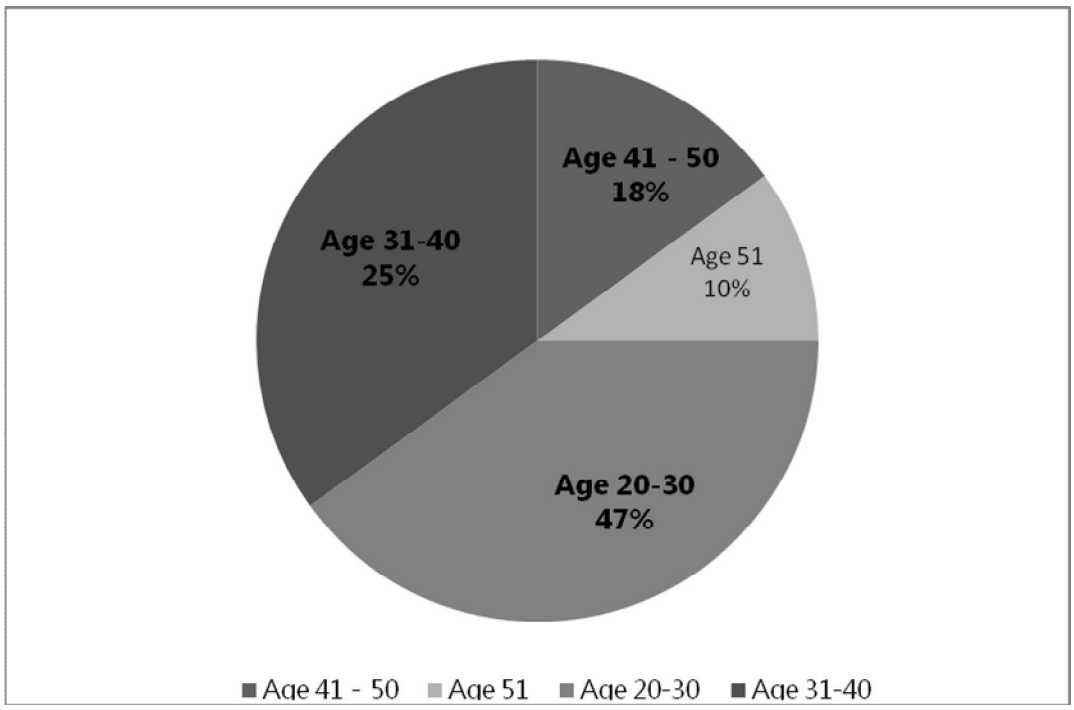


Fig. 4 Demographic characteristics of appendix II showing age distribution

Figure 4 presents the age difference of patients, caregivers and visitors. The chart reveals that a majority 47% are between the ages of 20-30, followed by 41-50 with 27%, ages 31-40 with 25% and lastly, only 1 respondent over 50 years of age.

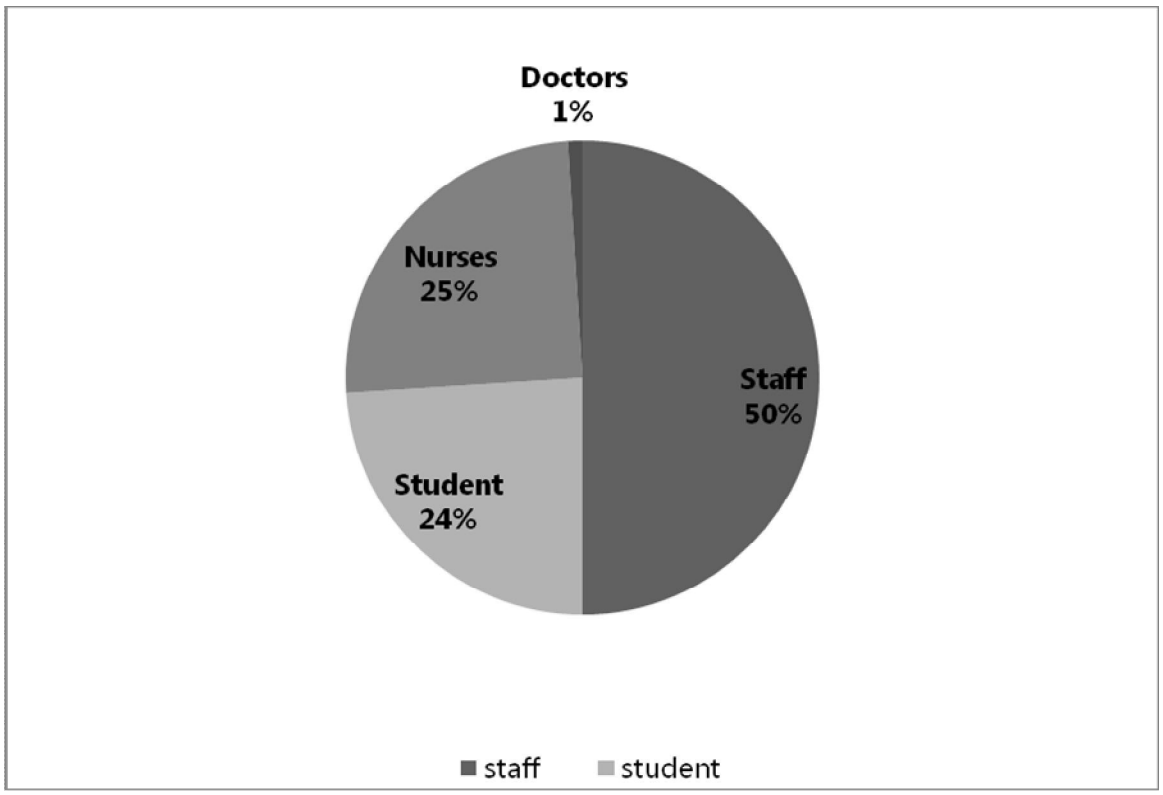


Fig. 5: Demographic characteristics of appendix II showing categories of respondents interviewed.

From the chart in figure 5, majority of those interviewed were visitors –representing 36%, followed by patients with 34%, and caregivers with 30%. 76% of the respondents were male while 24% were female.

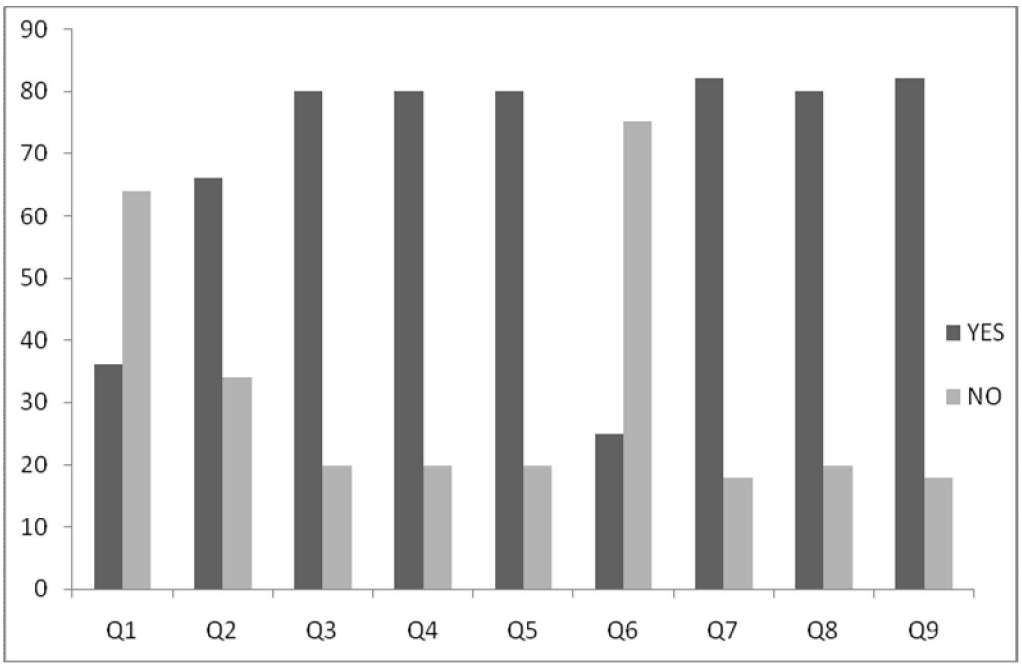


Fig. 6: Percentage scores on the ability of patients, caregivers and visitors to locate various units in the hospital.

Figure 6 presents the percentage response to questions related to the ability of patients, caregivers and visitors to locate various units around the hospital (Appendix II). The direct questions also sought to answer research question two. The level of agreement is presented as follows:

Question 1 stated: "Is this your first visit to Ahmadu Bello University Teaching Hospital?" 54% answered that it was not their first visit while 36% agreed that it was their first visit. Majority of those interviewed therefore, were not visiting the hospital for the first time.

Question 2: Did you find it difficult to locate various units in the hospital on your first visit?" 66% of the respondents agreed, while 34% disagreed.

Question 3: "Did you notice the various signs along the corridors and around the hospital?" 80% of the respondents agreed that they saw the signs, 20% disagreed.

Question 4 states: "Do you understand the writings on the signs?"80% of the respondents agreed and 20% disagreed.

Question 5: "Did the signs help in directing you to various units in the hospital?" Majority of the respondents making up 80% agreed that the signs aided in directing them while 20% disagreed.

Question 6: "Did you find your way without anyone's assistance?" 75% of those interviewed agreed that someone assisted them; only 25% did not need assistance to any location in the hospital.

Question 7: "Did you seek someone's assistance to find your way?" 82% agreed while 18% disagreed.

Question 8: "Was every member of staff/ student willing to assist you find your way? 80% were in agreement and 20% did not agree.

Question 9: "Were particular staff/students more willing to assist in directing you?" 82% agreed that security personnel in the hospital were more willing to assist them, 18% disagreed.

The results from the data in figure 3 found that while a lot of those interviewed were not visiting the hospital for the first time, majority them found it difficult to locate various units in the hospital on their first visit. Majority of respondents also indicated that they noticed the signs in the hospital stating that they also understood them, but majority also

agreed that they needed assistance to find their way. The figures also indicate that particular members of staff were more willing to assist in way finding, majority of the respondents mentioned that security personnel were of great assistance.

Additionally, a tenth question on appendix II was a test comprising five pictorial signs. The test sought to measure the symbol recognition skills of all the respondents interviewed, the results are presented in figure 7.

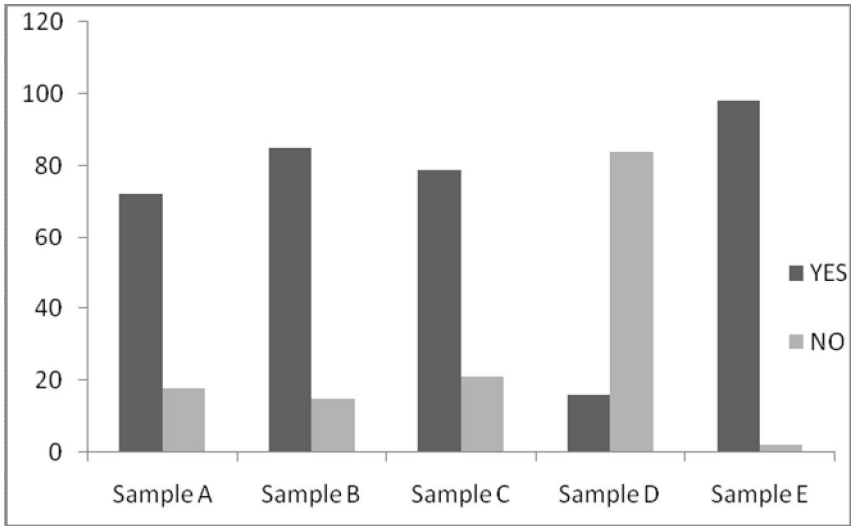


Fig. 7 Percentage scores on symbol recognition test.

The results of figure 7 indicate that 72% could recognize sample A, 83% recognized sample B, 79% could identify sample C, only 16% recognized sample D while 98% recognized sample E.

From the statistical data, majority of respondents failed to identify sample D –which is the symbol representing haematology. This is probably because it is partly abstracted.

A thorough content analysis was further employed to examine the design elements on the existing directional signs. This was accomplished through observations and documented

photographs by the researcher in order to effectively draw valid comparative conclusions in relation to standard principles of design.

The observations brought to fore the following deficiencies on the existing signs;

a) None of the existing directional sign panels have pictorial symbols that could complement textual communication, thereby aiding wayfinding;

b) Inconsistent type application: practically every directional panel bears a different typeface. On the contrary, it makes good design sense to maintain a uniform typeface throughout a display system to be used in any environment;



Plate XXXI: Existing directional sign panels with dissimilar typefaces
(Source: Field work)

c) Poor inter-letter spacing which leads to poor readability is a consistent feature on the existing signs. The inability to control transparency on the panels also makes the text to show through from the opposite sides of view, therefore obstructing legibility;

d) The panel in plate XXXII shows a very distinct anomaly of text size. The letter 'N' in 'oncology' and 'centre' both appear to be different font sizes and therefore out of proportion to the text line;



Plate XXXII: Existing sign panel showing inconsistent type application
(Source: Field work)

e) The only non-pictorial symbol on the existing signs – the arrow, is not used in harmony with the other elements in the design. All the arrows are relatively small in comparison to the text weight and size of the panels. Some of the arrows are broken with the head on one end and the tail on the other. The arrow designs are also conspicuously different.



Plate XXXIII: Existing directional signs indicating different direction arrow shapes (Source: Field work)

f) Inconsistent choice of materials: The existing signs were executed using different materials with no clear advantage for preferring any over another. The panels appear in metallic, wooden and plastic sheets.



Plate XXXIV: Existing directional signs executed on wooden, wall, metallic and cardboard panels. (Source: Field work)

g) Inconsistent choice of colour: Another inconsistency is in the colours adopted for the panel backgrounds. At least four colours were identified in the design of the existing signs; white, green, blue and black. No justification was put forward for these choices.

The above indications satisfy the corresponding objective of analyzing the existing directional sign system in Ahmadu Bello University Teaching Hospital, Shika. In the same vein it validates the aim of the study – which is the need to develop an alternative and more effective sign system for the hospital.

Research Question III.

What graphic elements can influence the development of effective directional signs within ABUTH?

Research Question IV.

Which standard symbols can be used on bilingual directional signs to improve access to various units of ABUTH?

The results of an interpretive test administered to assess the symbol recognition skills of the representative sample of the population, was the tool used to support research question four. The overall review of the existing signs at Ahmadu Bello University Teaching Hospital led to an analysis of its existing elements which in turn revealed design deficiencies that relate to text, proportion, colour application, legibility, and so on –which satisfied the demand of research question three. The resulting alternative design from this research considered those individual components, analyzed their properties in relation to standard design principles in order to produce an effective sign system that satisfies the demands of wayfinding in Ahmadu Bello University Teaching Hospital, Shika.

4.2 Typography:

Good typography persuades, informs, or provides information, capturing the viewer's eye and supporting the message one intends to convey. Careful letterform design and expressive typography can make the difference between delivering a mediocre solution or an outstanding one (Gibson 2009).

One of the first considerations in choosing type is to determine readability and legibility. Typefaces have specific personalities and suggest certain associations –some are traditional, others appear crisp and modern while some appear playful. When selecting a typeface, the designer must consider how it will impact the entire experience of the project undertaken.

The existing directional signs bear about five different styles of lettering (serif and sans-serif types). It is therefore clear that a solution should be sought with a uniform typeface that will be used in the entire sign system. Gibson (2009), states that careful letterform design and expressive typography can make all the difference between delivering a mediocre solution or an outstanding one.

A display type (type over 14 points) was considered for the design. Successful display type integrates words and pictures into a cohesive visual statement that can be quickly and easily understood. Display type is usually more expressive than body type and is intended to draw attention (Naughton, 2007).

Sans-serif font families are more suitable for display design in graphic communication. The letterforms of sans-serif show the essentials of a typeface. No terminal strokes or other extensions deflect the eye from the essential form, which is exceedingly sensitive

and registers the smallest errors of shape. Instead of a stubborn principle of construction, an abundant play of optical values dominates in all the characters (Frutiger 1980 b).

For an application that involves public information, readability and legibility are key- as already highlighted, so the SEGOE UI type was chosen for the sign system.

Segoe UI is a Humanist, sans-serif typeface family that is best-known for its usage by Microsoft. The company uses Segoe for user interface text, as well as for some online user assistance material - including recent logos for a number of products - designed to improve the consistency in how users see all text across all languages. It is distinguishable from its predecessor Tahoma and the Mac OS user interface font Lucida Grande by its rounder letters. (Anon.[7]).

Segoe UI was designed by Steve Matteson during his employment at Agfa Monotype, and Licensed to Microsoft for use as a branding typeface and user interface font, it was designed to be friendly and legible. The family includes 2 fonts in 2 weights, without italics. (Anon.[8]).



Fig. 8: Sample of Segoe UI Typeface (Normal and Bold)

4.2.1 Signage Typeface

An analysis of information sign examples show that the following visual properties could be considered as successful qualities that makes the Segoe typeface an appropriate choice for ABUTH sign system:

- **Need for consistent design characteristics:**

  A good text typeface will have consistent design characteristics throughout its full complement of characters. Consistency in capitals and x-heights (including the overhangs of curved characters), character width, stroke width, ascenders, descenders, serif details (if any), as well as the individual nuances and idiosyncrasies of the design. Related fonts in a family should be similar in spirit, if not in actual design.

- **Good Spacing**

  A typeface that is well-spaced looks neither too tight nor too open. Most importantly, it has even spacing overall between characters throughout the design.

- **Good Kerning**

  Even a typeface that is properly spaced will have specific character combinations that are too open or too tight (although a well-spaced design will have fewer of these than a more carelessly designed one). These awkward pairs can be improved with kerning, which is the addition or reduction of space between a particular combination of characters. High-quality typefaces have built-in kern pairs, which enhance an already well-drawn design (Naughton, 2007).

- **Good Letter spacing**

  As type gets larger, the letter spacing tends to look more open. A typeface that was designed for display sizes might not need much in the way of letter spacing adjustments. However, if you're working in large sizes with a typeface that was primarily intended for text, the letter spacing will probably appear too open. The solution is to use the design application's tracking feature to tighten the letter spacing.

- **Word spacing**

  Like the space between letters, the space between words gets to be "too much" as type size scales upward. Reducing excess word spacing improves appearance and readability.

Leave enough space to create a separation between the words, but not enough to create gaping white holes. This can most easily be accomplished by reverse kerning - the H&J (or justification) feature of your design software will let you make this adjustment as well. (Naughton, 2007).

- **Legibility**

  Legibility is especially important in text typefaces, which are usually used at smaller sizes and for greater amounts of copy.

  Simply put, the legibility of a typeface is the ease with which it can be read. Legibility is a quality of the actual design of the typeface (as opposed to how the type is set). Factors which affect legibility include;

- Open counterforms
- Pronounced ascenders and descenders
- Wider horizontal proportions
- More distinct forms for each character (such as tails on the lowercase letters “t” and “j”)
- Extended horizontal strokes for certain letterforms (such as the arm of the lowercase letter “r” or the crossbar of the lowercase letter “t”)
- Very distinctive look with high legibility
- High x-height

The fairly wide proportion, open counter forms and slightly longer ascenders and descenders all seem to improve readability.

4.2.2 Typeface Modification

Though Segoe UI possesses the qualities of a good display font, it was originally intended for low resolution screen display. Slight modifications were therefore effected

on the chosen typeface because of the researcher's inability to obtain a complete digital set of the preferred typeface. Frutiger Bold was therefore used as a template for the modifications. Segoe UI has a lot of similarities with the Frutiger family and can actually be used as its alternative, a proposition supported by Leurs.

Frutiger is a distinct and legible sans-serif typeface by the Swiss designer Adrian Frutiger. The availability of many variants and weights as well as its excellent legibility makes it a versatile font. It can be used for anything that needs a distinct and clean or modern look (Leurs, 2009).

One justification for the adjustments is the reflection of serifs in some of Segoe UI's letter forms – the capital letter "I" and the Latin Number "1". For a high resolution display use, the serifs had to be slashed to maintain the simplicity, legibility and warmth that has made its companion – Frutiger, popular today in signage, advertising and small print. The adjustments can be seen in figure 9.

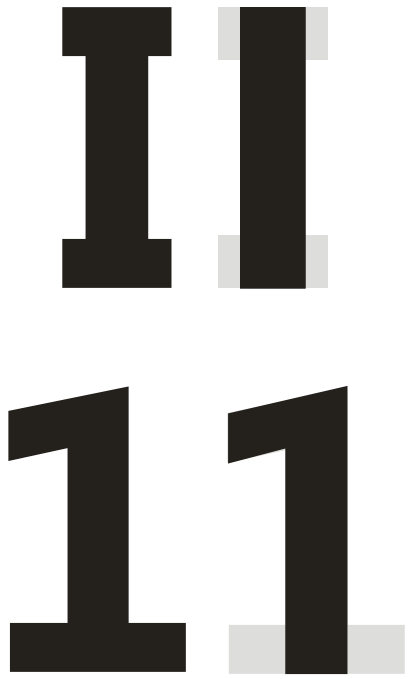


Fig. 9: Typeface modification

4.2.3 Colour:

Nothing creates mood faster than colour. It affects our senses, our outlook, even our behaviour. According to Dabner (2007), the colours you choose for any graphic design will not only provoke psychological and emotional responses, but should also support and enhance the formal aspects. Gibson (2009) suggests that in working on a signage system, the designer must first must narrow down the hue combinations that are appropriate for the architectural or environmental context, and also consider contrast and legibility.

Research studies have proven that our responses to colour are partly psychological based on the effect colours have on our eyes and nervous system, and partly influenced by our environment and life experiences (Sutton and Whelan, 2004). Starting with science at its

simplest, the retina focuses on colours as rays of light which have varying lengths and degrees of refraction, reflection, and absorption, depending on the hue. The eye's perception of colour triggers instantaneous reactions in the brain and autonomic nervous system.

For example, hot colours –such as red, orange, and yellow –have the longest wavelengths, requiring energy to view them. That is why those colours seem to pop out at you. They also stimulate the brain and raise pulse and respiration rates, figure 10 illustrates the visual reaction of hot colours to light coloured text.



Figure 10: Visual examples of hot colours and text

In contrast, cool colours –such as blues and greens –have the shortest wavelengths and easily enter the eye. That produces a calming and soothing effect while actually slowing the metabolism (Sutton and Whelan, 2004).

The psychological qualities of **green**, highlighted above, made it a suitable consideration for the background colour on the directional sign panels. Green is thought to have great healing powers and the ability to soothe and refresh. According to colour consultant J.L. Morton's Colour Matters website, people who work in green environments have fewer stomachaches. The paler the green, the more calming it is. That is one of the reasons hospital walls are often painted seafoam, to literally sedate worried patients and visitors (Sutton and Whelan, 2004).

The shade of green chosen for the panel background is based on the CMYK process colour conversion chart. The components of this green possess 100 percent Magenta (primary blue) and 100 percent Yellow which creates variation in the intensity of the white text and background.



Fig. 11: Panel background colour

Certain psychological attributes that make green a suitable colour for the sign design need also to be highlighted. According to Sutton and Whelan (2004), the following effects are associated with green shades:

- Pale green is physically the most relaxing and calming colour in the spectrum. As the easiest colour on the eye, it can improve vision.
- Vibrant greens remind people of the spring, nature, life, and youthful energy.
- Dark greens are associated with stability and growth, suggesting high economic status and success.
- Green is the worldwide symbol for safety. Green also means go.
- People who wear green are thought to be kind, dependable, and generous.

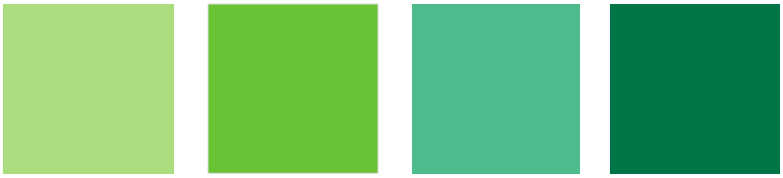


Fig. 12: Shades of green

Colors that work well are a dark background with a light colored text and pictograms. For example a black background with white illuminated lettering will ensure a high contrast which has a good readability from a distance. Other common color combinations are a yellow background with black lettering (Baumann 2008).



Fig. 13: Examples of high contrast colour combinations that will ensure good readability and legibility of signage.

4.2.4 Dimension of Sign Panels

Though the height and length of text determine the dimensions of the sign panels, it was still appropriate to maintain the traditional rectangular shape throughout the design. According to Ries (2003), the normal human sees the world through two horizontally mounted eyes peering out of his or her head. It's like looking out the windshield of a car. For instance, in their interpretation of *law of shape* for logotype design, they suggest that a logotype should have the same shape as a windshield for maximum visual impact – roughly two and one-fourth units wide and one unit high.

The justification for the choice of this proportion was further validated by the 'golden ratio' principle. The golden ratio is the ratio between two segments such that the smaller (*bc*) segment is to the larger segment (*ab*) as the larger segment (*ab*) is to the sum of the two segments (*ac*), or $bc/ab = ab/ac = 0.618$ (Lidwell, et al 2003).

At least since the Renaissance, many artists and architects have proportioned their works to approximate the golden ratio—especially in the form of the golden rectangle, in which the ratio of the longer side to the shorter is the golden ratio—believing this proportion to be aesthetically pleasing (designerfreelance.net).

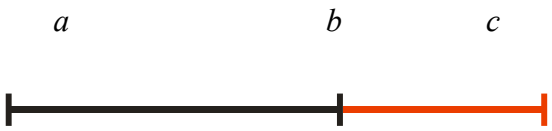


Fig. 14: Example of the golden ratio equation

Individual panels in the design therefore approximate 'golden rectangles'. For instance where the height of a particular panel is 900mm and the width is 525mm, the width divided by height yields a ratio of 1.7.

The indicator panel is perceived as it were, in three impulses. At first it is looked for and must be recognizable purely by its shape. It is established that the patient/visitor has only the panel to guide them as they go from panel to panel for a means of orientation. The symbol is perceived next in a block but with a clear illustration that stands out as an attractive direction aid. The lettering is perceived only with a third impulse.

4.2.5 Use of Pictograms

The most important non-alphabetical signs on the design are the arrow and pictographic symbols. The type of pictograms used in this research is classified under 'symbolic icons' –which are effective when actions, objects, or concepts involve well established and easily recognizable objects. The pictograms were developed from photographs, illustrations from live objects/scanned images and modifications on a few existing symbols (typically the pictograms can be described as geometric and illustrative).

The technique of highlighting was used for bringing attention into elements of the symbol on the sign panel. All the images are placed within a white box that is distinct from the green background area.

4.2.6 Arrow:

Arrows are one of the most important design features of a wayfinding system. With a pointing arrow you will be able to guide visitors to their destination.

They are the most universally understood symbols which is both an advantage and a disadvantage. The arrow means too many things. It denotes speed, forward, upward, down, across, the future, history, reaching out, shuttling back and forth, attack, a rise or fall in the economy, push, here, you (Holmes 1989).

As it is used in conjunction with other design elements in this sign system, it becomes fully potent as a symbol for direction. The shape of the arrow is constructed to fit a concentric circle, no matter to what degree it is enlarged, uniformity of all three arms will still be perfected achieved. The ends of the three arms were radiused to harmonize with the symbol highlight boxes and sign panel boards.

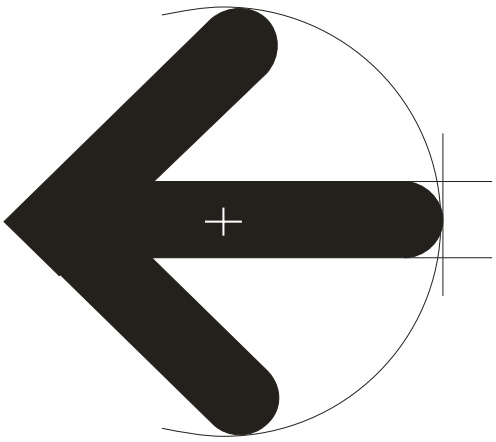


Fig. 15: Arrow design adopted on sign panels

4.2.7 Language Stability on Signs

The Hausa language is arguably the most important indigenous language throughout the area of West and Central Africa. Spoken by an estimated 40 to 50 million people as a first or second language, it is believed to be one of the most commonly spoken African languages, alongside Swahili (Anon.[9]). Hausa is widely used in West Africa. It is a first language in the northern Nigeria, in much of Niger, and is the second language for many people in Benin, Chad, Cameroon, and Togo, northern Ghana, Ivory Coast, Burkina Faso, Libya, southern Nigeria, and Sudan. In addition, communities of Hausa speakers can be found throughout the continent, as well as in Europe and the United States (Anon.[10]).

Hausa's modern official orthography is a Latin-based alphabet called *boko,* which was introduced in the 1930s by the British Colonial Administration. Hausa has also been written in *ajami*, a variant of the Arabic script, since the early 17th century. There is no standard system of using *ajami*, and different writers may use letters with different values (Schuh and Yalwa, n.d.). The Eastern Hausa dialect *Kananci* which is spoken in Kano State was adopted for the sign design. It is considered the standard variety of Hausa. The

BBC, Deutsche Welle and Voice of America offer Hausa services on their international web site using Kananci as standard. (Schuh and Yalwa, n.d.).

The adoption of *Kananci* variant for translation was validated by language experts in the department of languages, Ahmadu Bello University, Zaria.

4.7 Stages of Sign Development

In order to plan, organize, and develop visual communications it is important to relate to and study various communications models. These models actually outline aspects of the process that are important but not always evident. Generally speaking, models should be selected, adapted or developed for specific problems (Wallschlaeger and Busic-Snyder 1992). David K. Berlo's model of human communication and Charles Morris's model of the theoretical structure of signs and their significance provided the support on which the medical pictograms in this research were developed.

4.3.1 Berlo's Model of Human Communication

Berlo's model of communication provides a logical structure for stages in the communication process as it is applied to visual messages which increases the probability that the viewer will understand and respond in the desired manner.

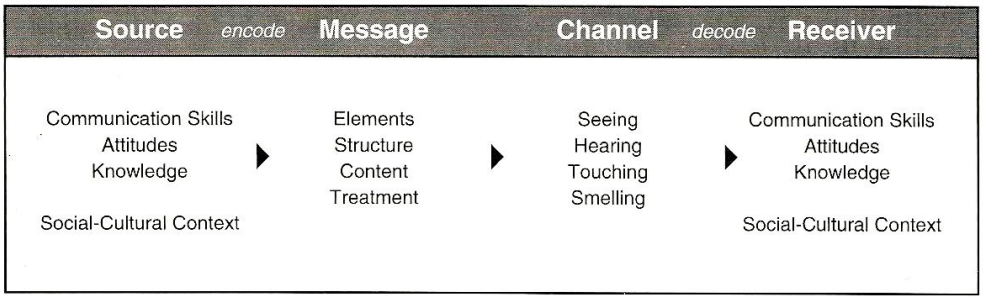


Fig. 16: Outline of David K. Berlo's model of human communication
(Source: Charles Wallschlaeger)

Following are the steps within the model that guided the process of developing the resulting medical symbols:

a) Source/Encoder: this refers to the person or group of persons sending the message. Within the context of form generation, the source/encoder is the researcher.

b) Message: the intended statement, idea, or feeling communicated. The message code used in this research is a verbal language composed of terms and definitions in combination with the visual message –which consists of symbols.

c) Channel: the mode of sending the message to the receiver. The sense of sight (visual) is primarily affected by the medium and material of communication (thermoplastic sheets, symbols, and text in various colours).

d) Receiver/Decoder: the person or groups of persons for whom the message is intended. The receiver of this sign message is a general audience, but it also targets a specific group –the predominant Hausa/Fulani population in the host community of Ahmadu Bello University Teaching Hospital, Shika.

4.3.2 Charles Morris's theory of the theoretical structure of signs and their significance

Charles W. Morris's Semiotic Theory explores the relationship of the theory of signs and its effect on the process of creating purposeful signs, symbols, and messages. According to Morris, there are three areas in which signs function as a sign: sign vehicle, that which acts as a sign; designatum, that which a sign refers to; and interpretant, the effect on an interpreter. (Wallschlaeger and Busic-Snyder 1992).

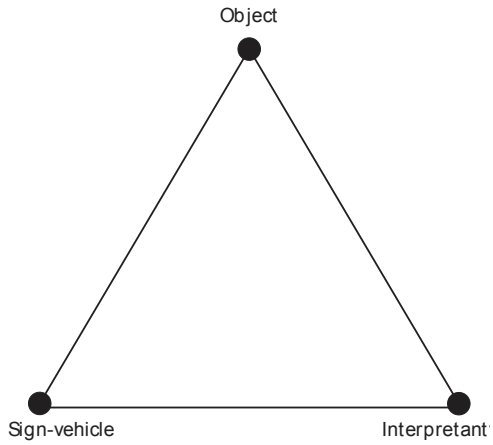


Fig. 17: Morris's triadic model of the theoretical structure of signs
(Source: Wallschlaeger)

Morris's triadic model (Figure 17) was instrumental in identifying a vocabulary which assisted in the nature of pictorial signs developed in Ahmadu Bello University Teaching Hospital. It was utilized to break down the sign process into three basic categories: **syntactic** –signs and their formal relations to other signs (identifies with the sign structure); **semantic** –signs and their relations to the objects they represent (identifies with the meaning of the signs); and **pragmatic** –signs and their relations to the interpretant (referring to the function of the signs).

4.3.3 The Design Process

Every design undertaking involves taking predictable steps that define the design process. Several concepts and ideas were generated in the course of seeking suitable solutions for a more purposeful sign system –first, the designs started with thumbnail sketches and graduated to comprehensive roughs. Once the concepts were finalized, the best solutions were fused to achieve overall balance, meaning, stability, symmetry and unity of the compositional elements on the sign panels.

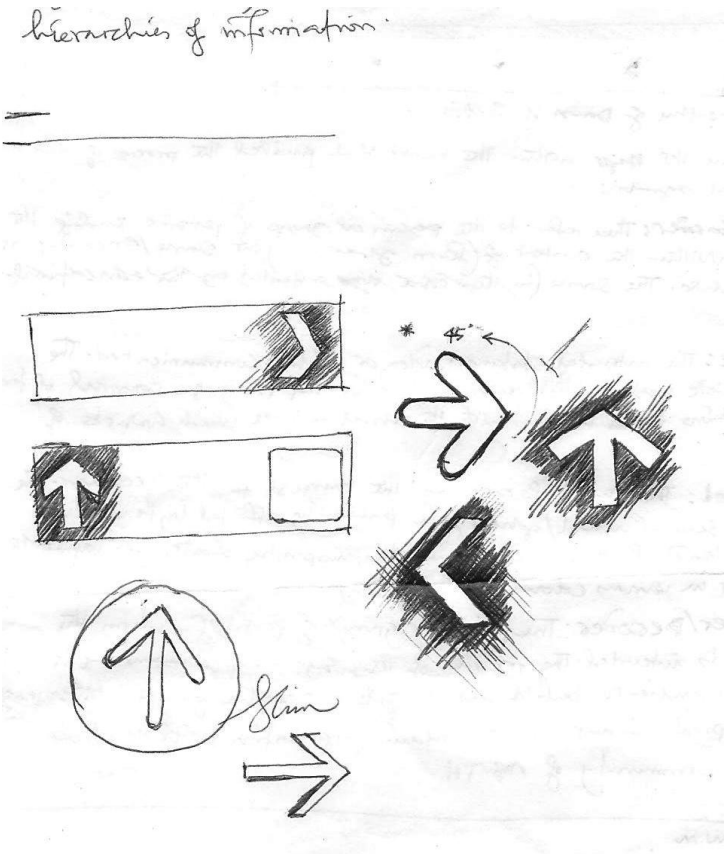


Fig. 18: Thumbnail Sketches for different arrow designs
Source: Original research illustration by Kange Raymond

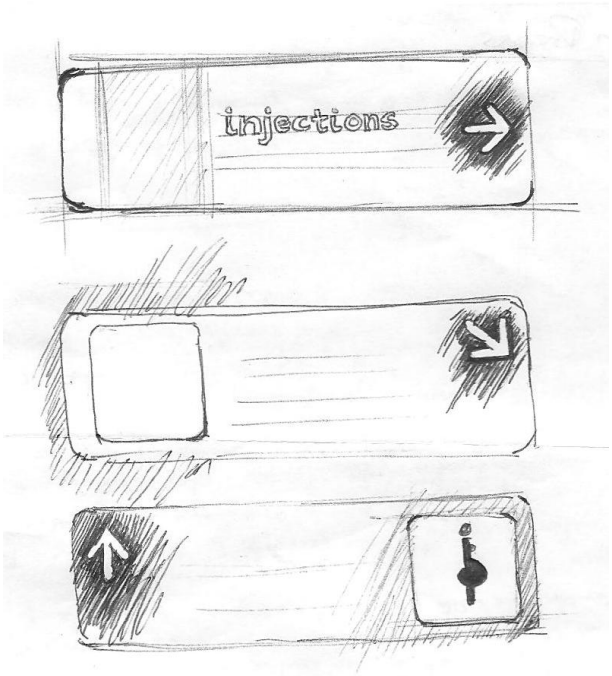


Fig. 19: Rough sketches for arrow direction and symbol position
(Source: Original research illustration by Kange Raymond)

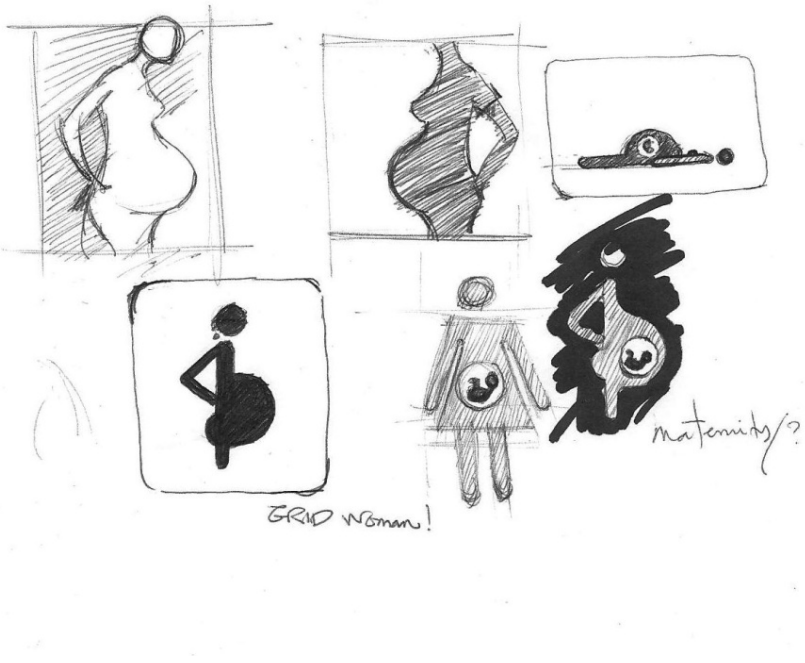


Fig. 20: Thumbnail and comprehensive roughs for ‘maternity’ symbol
(Source: Original research illustration by Kange Raymond)

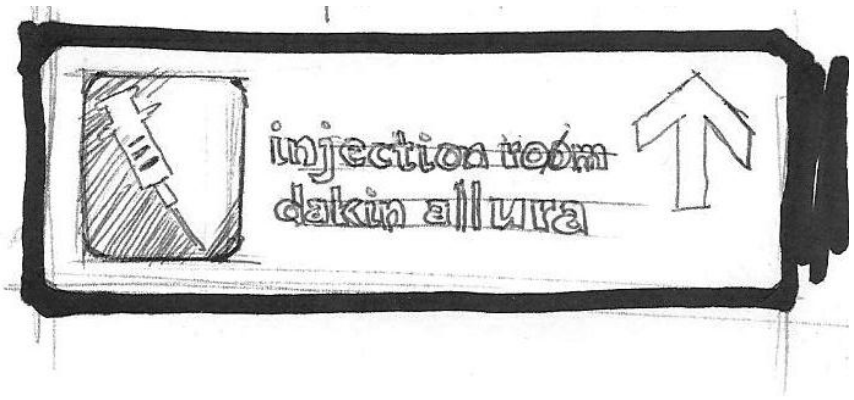


Fig. 21: Comprehensive layout for 'injection room' panel
(Source: Original research illustration by Kange Raymond)

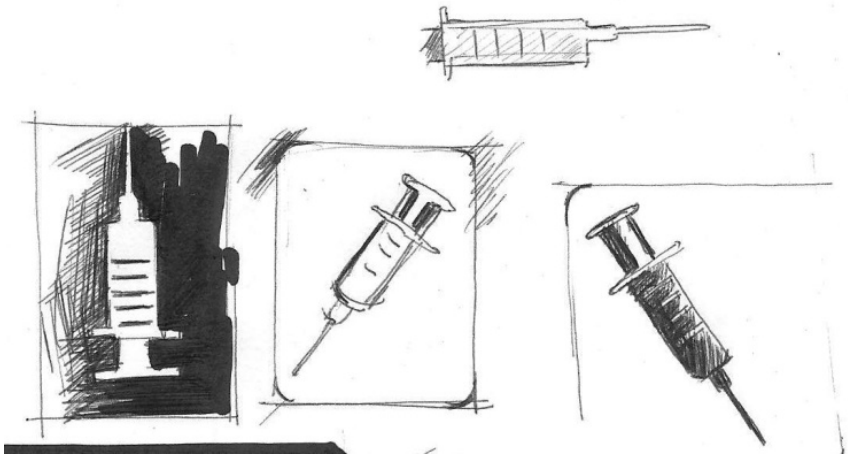


Fig. 22: Thumbnail sketches of syringe and needle for injection room symbol
(Source: Original research illustration by Kange Raymond)

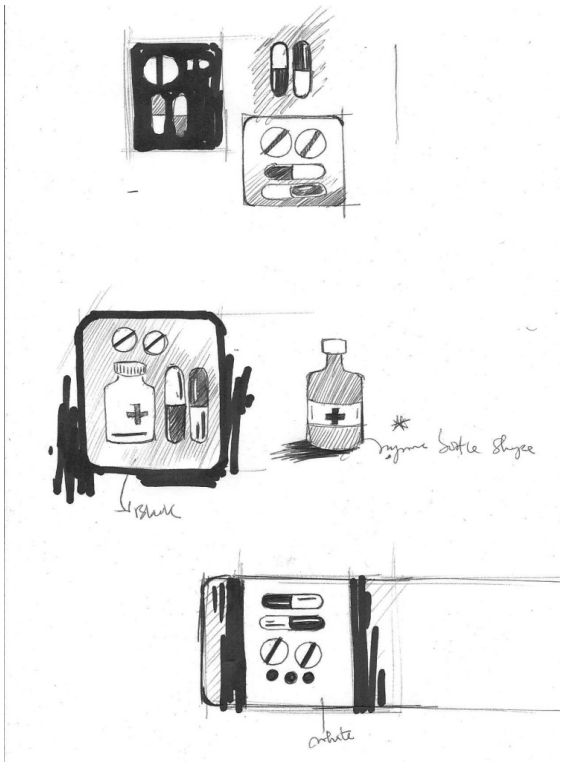


Fig. 23: Comprehensive roughs for ‘Pharmacy layout
(Source: Original research illustration by Kange Raymond)

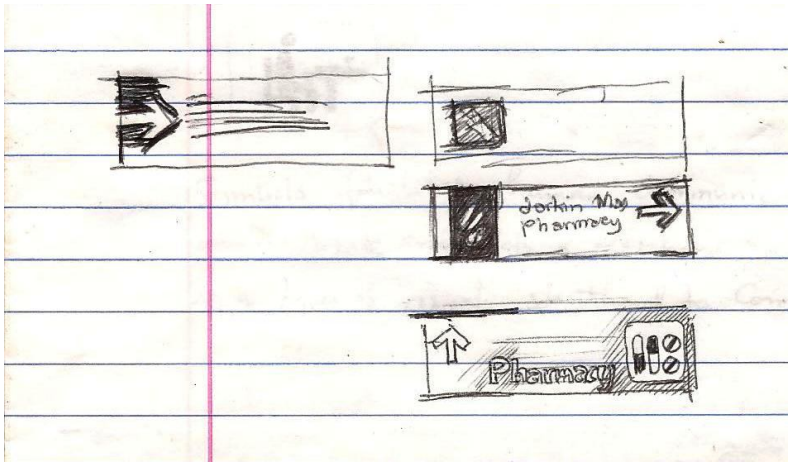


Fig. 24: Thumbnail sketches for Pharmacy layout
(Source: Original research illustration by Kange Raymond)

4.4 Result of Pictorial Symbols Designed by the Researcher



Fig. 25: Injection Room
Source: Modified by Kange Raymond, Original illustration; Kuwayama 1989.



Fig. 26: Blood Transfusion
Source: Original research illustration by Kange Raymond



Fig. 27: Pharmacy
Source: Original research illustration by Kange Raymond



Fig. 28: Theatre
Source: Original research illustration by Kange Raymond



Fig. 29: Pediatrics
Source: Original research illustration by Kange Raymond



Fig. 30: Maternity
Source: Original research illustration by Kange Raymond



Fig. 31: Dental Clinic
Source: Original research illustration by Kange Raymond

4.5 Pictorial Symbols Adopted from other Sources

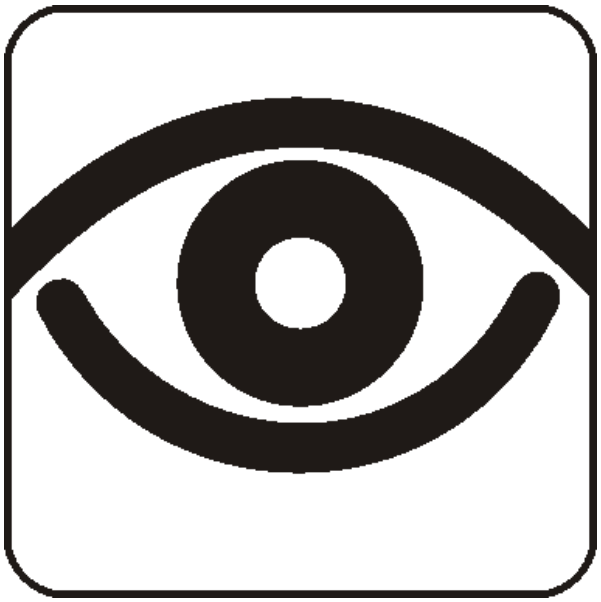


Fig. 32: Ophthalmology/Eye Clinic
Source: Kuwayama, Y. From *Trademarks and Symbols of the World*



Fig. 33: Emergency
(Source: designofsignage.com)



Fig. 34: Psychiatry
(Source: www.designofsignage.com)



Fig. 35: Physiotherapy
(Source: www.designofsignage.com)



Fig. 36: Nurse
(Source: Society for Environmental Graphic Design, 2005)



Fig. 37: Information Unit
(Source: Society for Environmental Graphic Design, 2005)

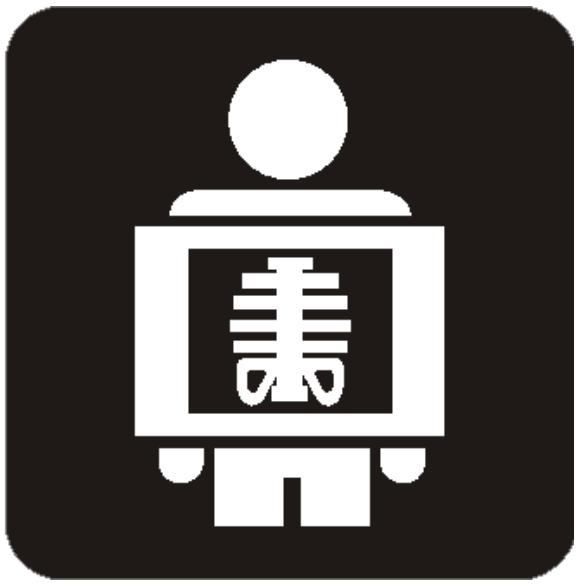


Fig. 38: X-ray
(Source: Society for Environmental Graphic Design, 2005)



Fig. 39: Examination
(Source: Society for Environmental Graphic Design, 2005)

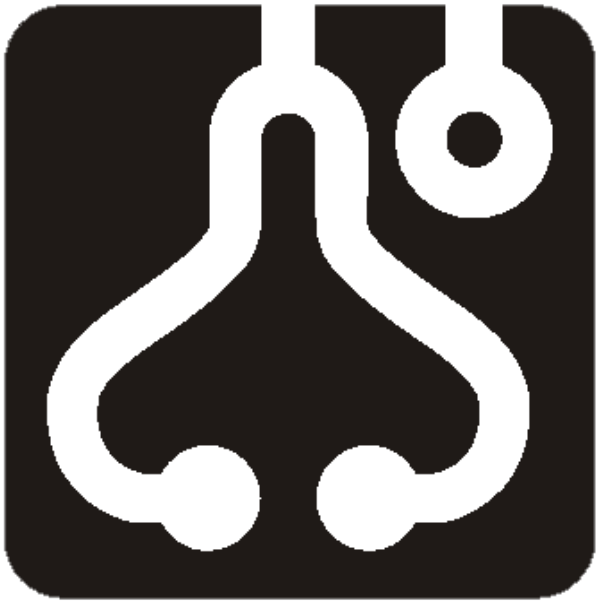


Fig. 40: Consulting Doctor
(Source: Society for Environmental Graphic Design, 2005)



Fig. 41: Female Figure
(Source: www.designworkplan.com, 2009)



Fig. 42: Male Figure
(Source: www.designworkplan.com, 2009)

4.5.1 Brief Discussion of Pictograms

According to Wallschlaeger and Busic-Snyder (1992), a pictogram can be geometric, illustrative, photographic, or typographic. As previously discussed in the questionniare relating to the ability of patients, visitors and caregivers to locate various units around the hospital (Appendix 2), majority of those interviewed could not recognize the only abstracted symbol when tested (a syringe designed by Kuwayama (1989) representing Injection Room). In order to guarantee maximum comprehension and convey clearly the tended meaning, most of the symbols developed and adopted for the sign system are geometric and photographic.

In both types of design, the action, person, or object represented are in most cases realistic so should be easily distinguishable without much effort. Figure 4.26 (Blood

Transfusion) illustrates the most realistic symbol developed since the design breaks from the consistent white and black colour code to introduce the red -which is indicative of blood.

Some of the symbols are also silhouetted (imposed against black backgrounds), this was a measure taken to add to the clarity of the message. For instance, the most recognizable image of a nurse is a person in white so it makes good judgment to have a white image against a contrasted background. The same applies in the 'syringe' and 'physiotherapy' symbols.

The symbols are positioned on the left side of the sign panels -making it an immediate attractive element. This layout is justified by the orientation of the human eye which processes information easier from left to right.

Gopen and Swan (in Raffensperger 2008) used linguistics and cognitive psychology to study style for technical documents. They wrote,

> Since we read from left to right, we prefer the context on the left, where it can more effectively familiarize the reader.

4.6 Result of Designed Bilingual Directional Signs

Following are the designs achieved with effective use of sign elements;

Injection Room
Dakin Allura


Pharmacy
Dakin Magani


Children's Ward
Sashen Yara
1


Delivery Suite
Dakin Haihuwa


Blood Transfusion
Karin Jini


Physiotherapy
Sashen Kula da Lafiya


Examination
Sashen Gwaje Gwaje

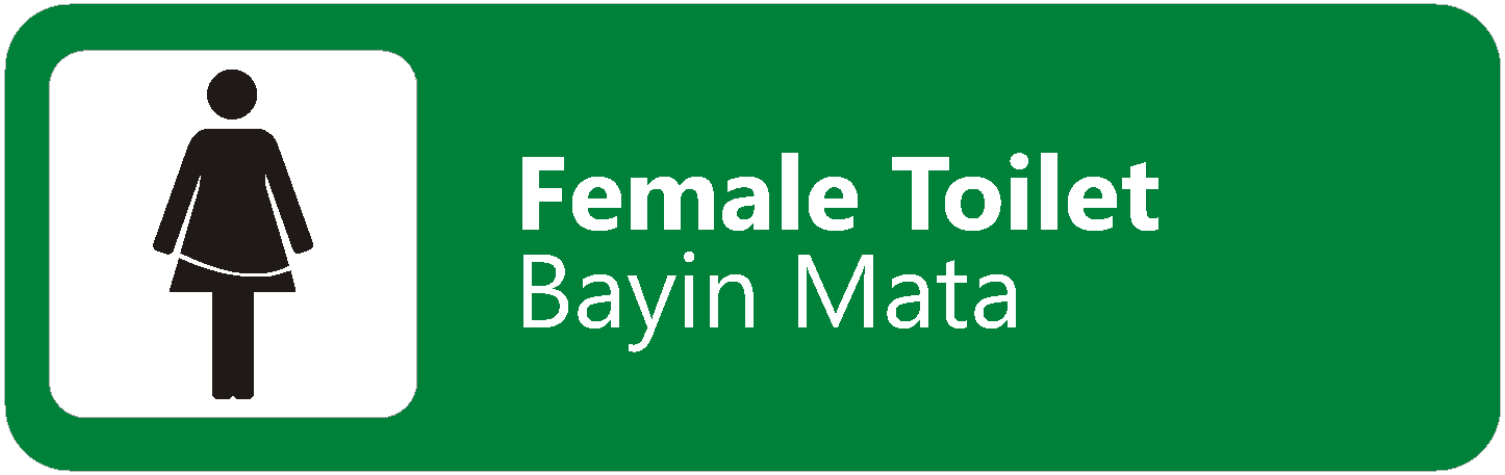

Information/Complaint Unit
Sashen Koke Koke da Bayanai


X-ray
Dakin Dokan Hotonan
Jiki


Ganin Likita
Consulting Doctor


Nurse
Maaikatan Jinya


Dental Clinic
Sashen Duba Hakora


Female Toilet
Bayin Mata


Male Toilet
Bayin Maza

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The purpose of this study was to develop medical pictograms on bilingual signs in Ahmadu Bello University Teaching Hospital, Shika. In the process of collecting data, photographs of the existing signs were recorded for content analysis in comparison to standard design practice. An interview session was also conducted with the head, department of works and maintenance.

Two questionnaires were designed to assess wayfinding activity within the hospital; one was administered on staff and students, and the other – which included a symbol recognition test – on patients, caregivers and visitors.

This chapter therefore aims to summarize the results of the research, discuss its implication in relation to existing knowledge and bring out its implications for further research.

5.1 Summary

The importance of pictorial symbols in a sign system was the highlight of this research. Three questions were investigated in the course of this study, and the following conclusions were reached in relation to each of them:

1) *To what extent do the existing directional signs functionally meet the purpose of directing patients and visitors at the hospital?* The study found that even though majority of those interviewed agreed that they noticed the existing directional

signs at the hospital, 75% of them agreed also that they needed someone else's assistance to get to locate their destination.

2) *What appropriate pictorial symbols can be used on directional signs to improve access to various sections of Ahmadu Bello University Teaching Hospital, Zaria?* Results from appendix I indicate that 70% of staff, Doctors, Nurses, and students at the hospital strongly agreed to the proposition of including relevant symbols on directional signs. An average pass score of 85% was recorded from the symbol recognition test conducted on five appropriate symbols designed by the researcher to be used on new directional signs. (The International Organization for Standardization (ISO) uses the figure of sixty-seven percent of the control group comprehending the symbol as being acceptable for adoption and use with their symbol systems).

3) *How can the para-graphemic elements of typography, colour and proportion be appropriately utilized to produce more effective directional signs?* The font qualities of legibility, readability and aspect ratio were considered in regard to the typeface adopted for the sign system -along with uniformity and harmony in relation to panel colours. Lastly, the universal 'golden ratio' principle of design was applied to determine a more aesthetically appealing and optically balanced design outcome.

5.2 Findings/Conclusions

Based on the documented observations, interview session and results of data obtained from questionnaires, the findings in the research led to the following conclusions:

i. There is a sign system already in use at Ahmadu Bello University Teaching Hospital, Shika, however, this research evaluation revealed that they are not professionally fit for a modern hospital like ABUTH;

ii. In a total sense, patients, caregivers and visitors find it difficult to locate various sections of Ahmadu Bello University Teaching Hospital – especially on initial visits;

iii. It is evident from the existing signs that the importance of directional signs for ABUTH is given some consideration. Information from the Works and Maintenance Department however, confirms that there's no written document or guideline that supports their production;

iv. Although visitors and patients agreed that the existing signs in the hospital helped in directing them to the various units, however, it was revealed that majority of them needed some form of assistance or the other in finding their way at some points;

v. Visitors, staff and students at the hospital consented that the existing signs in the hospital do not possess the quality to make wayfinding easier. They also unanimously agreed that the number of signs available are insufficient for the hospital of this magnitude;

vi. Majority the staff members interviewed admitted that they had on several occasions assisted guests locate various sections of the hospital while on duty. From the patients and visitors' point of view, it was revealed that security staff were more willing than nureses and doctors to assist in giving directions to guests who needed assistance;

vii. Regardless of their literacy level, most patients, caregivers and visitors could recognize 90% of the symbols shown to them;

viii. Majority of respondents tested could not recognize the abstracted symbols. In essence, the differential outcome means signs that cannot be designed any simpler than they appear may need to be learned over time;

ix. The appropriate combination and manipulation of the elements and principles of design

5.3 Recommendations for Further Research

1) The study of information design has huge potential for exploration. The bilingual result accomplished by this study can be extended to other language groups across Nigeria – and could encompass multilingual applications.
2) Further research can be carried out on the design of symbols for hospital use. Challenges such as designing localized symbols for Intensive Care Unit, Immunology, Outpatient, Dialysis, etc, present opportunities for advancing knowledge in the field of semiotics.
3) Another prospective area of sign development could also be the production of lighted signs which can be more effective during the night, or in poorly lit areas.

5.4 Contribution to Knowledge

Research conducted within and beyond the scope of this work has established that communication is greatly aided by the use of pictorial symbols. This study exposed the poor appreciation of symbol usage in Nigeria and highlighted its advantage as an effective aspect of public sign design for Nigeria's multiethnic and multi-linguistic setting.

- The outcome of this research creates a background on which to establish professional guidelines for the production of standard directional signs in Ahmadu Bello University Teaching Hospital, Shika.
- The result of this study also forms a base that can accelerate the promotion of symbol learning skills among Zaria inhabitants – especially non literates.

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APPENDIX 1

STAFF AND STUDENTS' QUESTIONNAIRE

DEVELOPMENT OF MEDICAL PICTOGRAMS ON BILINGUAL DIRECTIONAL SIGNS IN AHMADU BELLO UNIVERSITY TEACHING HOSPITAL, SHIKA-ZARIA.

Dear respondent,

I am a postgraduate student of Graphic Design section, Industrial Design Department, Ahmadu Bello University, Zaria. This questionnaire is partial fulfillment of a research towards the award of an M.A. Degree in Industrial Design. The questionnaire is designed to assess the ability of patients, visitors and caregivers to find their way around Ahmadu Bello University Teaching Hospital, Shika-Zaria.

All information given will be treated in confidence. Kindly respond appropriately to the following questions:

SECTION A

PERSONAL DATA

1. **Male** ▱ **Female** ▱

2. **Staff** ▱ **Student** ▱ **Doctor** ▱ **Nurse** ▱

3. **Age:** 20-30 ▱ 31-40 ▱ 41-50 ▱ 51 and above ▱

4. Educational Qualification:
   - i. School Certificate ▱
   - ii. University ▱
   - iii. Others:

   _____

SECTION B

QUESTIONS RELATED TO STAFF AND STUDENTS' EVALUATION OF WAYFINDING ACTIVITY WITHIN THE HOSPITAL

S/N	Questions	Strongly Agreed	Agree	Uncertain	Disagree	Strongly Disagreed
1	Patients, visitors and caregivers express difficulty in finding their way while in the hospital					
2	I often help direct patients and visitors to locate various units while on duty					
3	I use the existing signs as a directional aid					
4	The existing signs satisfy their need in my directions					
5	It is important to have directional signs within and around the hospital					
6	The existing signs are good enough by my evaluation					
7	The available signs are adequate for Ahmadu Bello University Teaching Hospital					
8	Pictorial symbols should be used on directional signs in the hospital					
9	Hausa text should be included on the directional signs					
10	The importance of signs was highlighted in my training					

Thank you.

Kange Raymond Kahnge

APPENDIX 2

PATIENTS, VISITORS AND CAREGIVERS' QUESTIONNAIRE

DEVELOPMENT OF MEDICAL PICTOGRAMS ON BILINGUAL DIRECTIONAL SIGNS IN AHMADU BELLO UNIVERSITY TEACHING HOSPITAL, SHIKA-ZARIA.

Dear respondent,

I am a postgraduate student of Graphic Design section, Industrial Design Department, Ahmadu Bello University, Zaria. This questionnaire is partial fulfilment of a research towards the award of an M.A. Degree in Industrial Design. The questionnaire is designed to assess the ability of patients, visitors and caregivers to find their way around Ahmadu Bello University Teaching Hospital, Shika-Zaria.

All information given will be treated in confidence. Kindly respond appropriately to the following questions:

SECTION A

PERSONAL DATA

5. **Male** ▱ **Female** ▱

6. **Patient** ▱ **Visitor** ▱ **Caregiver** ▱

7. **Age:** 20-30 ▱ 31-40 ▱ 41-50 ▱ 51 and above ▱

SECTION B

QUESTIONS RELATED TO THE ABILITY OF PATIENTS, VISITORS AND CAREGIVERS TO LOCATE VARIOUS UNITS AROUND THE HOSPITAL

S/N	Questions	Yes	No
1	This is my first visit to Ahmadu Bello University Teaching Hospital		
2	I found it difficult to locate various units within the hospital on my first visit		
3	I have noticed the various signs along the corridors and around the hospital		
4	I understand the contents on the signs		
5	The signs helped in directing me to various locations in the hospital		
6	I found my way without the assistance of anyone		
7	I sought someone's assistance just once to find my way		
8	Everyone was willing to assist me find my way		
9	Particular people among the staff members were more willing to assist in directing me		

10 I can identify what the following signs indicate:







Thank you.

Kange Raymond Kahnge

APPENDIX 3

AN INTERVIEW WITH THE HEAD, DEPARTMENT OF WORKS AND MAINTENANCE, ABUTH, MR I. M. MAJEBI, MAY, 2010

1) **Is the the importance of directional signs highlighted anywhere in the operational plan of abuth?**

   It is obvious with the existing signs, if not, it would be difficult for patients particularly to find their way. Though there is no written document to support my assumption –there may be one which I have not seen, but i will find out after your enquiry.

2) **Is there any guideline specifying how they should be produced?**

   There is no guideline

3) **When were the existing directional signs at ABUTH produced?**

   There is no specific date. Various units at the hospital were developed at different periods so signs were produced to cater for them accordingly. Some signs were produced before the commissioning of the hospital and new ones are produced as the need arises.

4) **Do you have an idea who produced the existing signs?**

   Some of them where produced by works and maintenance department, others by contractors.

5) **Do you consider the existing signs sufficient for the need of directing people?**

I think they are adequate given the purpose they are serving. New units and structures are been developed, they will all be rquired to have more signs sooner or later.

6) **What is your assessement of visitors and patients' ability to find their way easily within the hospital?**

We have never at any point given thought to the effectiveness of the signs, but we have not gotten any complaints from the users either. I think since the users usually dictate what they want, that is what we will put out.

7) **Will the hospital management be prepared to fund the production of alternative and, perhaps, more professionally executed signs for ABUTH?**

If management sees the need for such a proposal, funds will be made available depending on their approval.

APPENDIX 4

LETTER OF INTRODUCTION

DEPARTMENT OF INDUSTRIAL DESIGN
AHMADU BELLO UNIVERSITY, ZARIA - NIGERIA
E-mail: did@abu.edu.ng, marsully@mail.com :08035982946

Vice Chancellor: Professor Shehu U. Abdullahi DVM(ABU), Ph.D (USA), FIMC, mni(Kuru), CSM (CU/SA)
Head of Department: Dr. Umar A. A. Sullayman B.A. (Hons), M.A. Ph.D (ABU), ATC (london), ATSIC (Devon), DIT (Kent), MCerAN, MCPAN, PMSN

3rd April, 2009

TO WHOM IT MAY CONCERN

I write to introduce KANGE KAHNGE RAYMOND as a graduate student of Industrial Design, Faculty of Environmental Design, Ahmadu Bello University Zaria with Registration Number MA/ENV.DES/03027/2006-07.

He is studying for a Master's degree in Graphic Communication and his research is based on Developing Medical Pictograms for Bilingual Directional Signs in Ahmadu Bello University Teaching Hospital, Zaria. This topic is relevant, and given adequate support, will impact on wayfinding ability within the facility.

I therefore recommend the student for any assistance he may need from you in order to accomplish this academic work.

Thank you.

Yours faithfully,

3.4.09

Dr. Umar A. Sullayman
Head of Department

Sections: Basic Design Ceramics Glass Technology Graphics Textiles

APPENDIX 5
PERMISSION TO CONDUCT FIELDWORK

Aliu Basawa Street,
Danraka, Samaru - Zaria

Tel.; 08036054725
E-mail: okahnge@yahoo.com

28th May, 2009

The Chief Medical Director,
Ahmadu Bello University Teaching hospital,
Shika - Zaria.

Sir,
REQUEST FOR PERMISSION TO CONDUCT FIELD WORK

I am a graduate student of Industrial design, faculty of Environmental Design, Ahmadu Bello university, Zaria. My specialization is in graphic communication and I am presently researching on **Developing Medical Pictograms for Bilingual Directional Signs in Ahmadu Bello University Teaching Hospital, Shika -Zaria.**

I hereby request your official permission to enable me carry out my field work within the hospital premises. My activities will include, among others;

a) Photographic documentation of existing directional signs for evaluation
b) Interview sessions with hospital staff, patients and visitors to establish research validity, and
c) Request for relevant medical records and layout plan of ABUTH complex

Please find attached, a letter of introduction from my head of department for necessary verification. Thank you very much as I anticipate your favorable response.

Yours faithfully,

Kahnge K. Raymond

APPENDIX 6
MANAGEMENT'S APPROVAL TO CONDUCT FIELDWORK

Ahmadu Bello University Teaching Hospital
P.M.B. 06, Shika - Zaria, Kaduna State, Nigeria. ☎:069-550098, 551399
Fax: 069-555001, E-Mail: macoabuth@yahoo.com

Board Chairman: Prof. B. D. Musa, MBBS, MRCOG, FMCOG, FWACS, FICS, FRCOG, OON
Chief Medical Director: PROF. ABDULMUMINI H. RAFINDADI, *MBBS, FMC-Path.*
Chairman, Medical Advisory Committee: DR. LAWAL KHALID, *MBBS, FMCS, FWACS, FRSC(ED), mni*
Director of Administration: BARR. ISHAK BELLO, *LL.B, BL, LL.M, PGDM, AHAN, FCAI*

Our Ref: ABUTH/TRG/47 15th June, 2009

Mr. Kahnge K. Raymond,
152 Aliu Basawa Street,
Danraka, Samaru,
Zaria.

Dear Mr. Raymond,

APPROVAL TO CONDUCT FIELD WORK

I have directives to refer to your letter dated 28th May, 2009 together with the letter of introduction from the Head of Department, Dept. of Industrial Design, A.B.U., Zaria on the above subject matter.

I write to inform you of Management's approval for you to conduct the field work in this organization on your research topic "Developing Medical Pictograms for Bilingual Directional Signs in Ahmadu Bello University Teaching Hospital, Shika-Zaria".

Please note that all data obtained during your field work should be used only for academic purposes.

By copies of this letter, I am informing all concerned of my correspondence with you.

Yours sincerely,

MRS. M. BEZUM
Chief Admin. Officer (E&SD)
For: Chief Medical Director

APPENDIX 7

STUDIO WORK IN PROGRESS



Plate XXXVI: Preparing pictograms for transfer unto vinyl surface
(Source: original photograph by Kange Raymond)



Plate XXXVII: Printed typeface template arranged on thermoplastic surface
(Source: original photograph by Kange Raymond)



Plate XXXVIII: Text aligned with completed ‘Injection Room‘pictogram
(Source: original photograph by Kange Raymond)

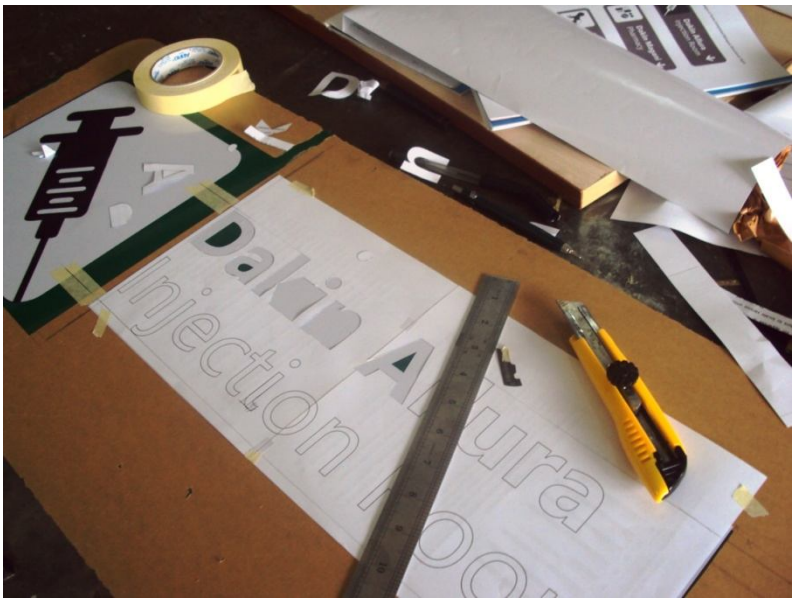


Plate XXXVIIII: Cutting through typeface template
(Source: original photograph by Kange Raymond)



Plate XL: Positioning arrow on top right corner of sign panel
(Source: original photograph by Kange Raymond)



Plate XLI: Cleaning up typeface edges
(Source: original photograph by Kange Raymond)



Plate XLII: Peeling protective paper to expose sign panel surface
(Source: original photograph by Kange Raymond)



Plate XLIII: Close up of pictogram and text layout
(Source: original photograph by Kange Raymond)



Plate XLIV: Close up of text and ward number
(Source: original photograph by Kange Raymond)



Plate XLV: Completed 'Pharmacy' sign
(Source: original photograph by Kange Raymond)



Plate XLVI: Double-checking balance of sign elements on panel
(Source: original photograph by Kange Raymond)